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If it is Superb Hosiery come to us. We distribute them wholesale. S. C. Lahiri & Co., 88, Cross Street, Calcutta. 709 WA

Always insist on D. N. Bose's Hosiery Factory. Renowned "Sankha and Padma" Brand Ganjee. Really durable and best, 86-1A, Sarkar Lane, Calcutta. 721 WA

Drink TOSH'S TEA
A. TOSH & SONS.
TEA MERCHANTS, CALCUTTA

ARMY ENGINEERING CORPORATION
42, STRAND ROAD, CALCUTTA

Editor:
K. N. Banerjee.

VOL. XXXIX. CALCUTTA, OCTOBER, 1948. No. 463.

RE-IMPOSITION OF CONTROL

IN the background of mounting inflationary spiral, the problem of distribution looms large and calls for immediate action and efficient adjustment. The gap between money supply and supply of consumers goods has an unmistakable tendency to become wider and wider, spelling ruin and disaster to millions of our countrymen.

As matters stand now, Government have to, for the present, bid good-bye to its original policy of progressive decontrol which has obviously failed to produce the desired consequences and our hopes of a gradual dehoarding of stocks as a result of gradual decontrol have been completely belied. The prices of essentials instead of falling down have mounted up to incredible heights while production both agricultural and industrial in spite of Government's vigorous drive for it, exhibits a fatal tendency to decline particularly in such vital items as food crops, cotton piecegoods, steel and cement since the end of the War.

Thus when there is a pronounced scarcity in most of the categories of consumers goods in relation to consumers' demand for it and when production fails to catch up with the difference, "Control" over wholesale and retail distribution of the daily necessities of life becomes a paramount necessity. Control measures have, however, to be re-oriented and reshaped in the light of past experience. The system of control, first instituted in 1943, as an effective machinery for fair and equitable distribution could not function properly owing to certain inherent defects in the system. The success of price control, in a large measure, depends on (1) prompt and wide distribution of consumption goods, (2) rigid vigilance against black-marketting which is a natural corollary of unbalance between consumers' minimum needs and the alloted supplies in the control system, (3) a high standard of integrity and honesty in the Government apparatus. But unfortunately the previous control system was deficient in all these respects. So the re-control policy under contemplation will have to be formulated with reference to the above basic principles of a successful control system. And Government should see that the public can secure their alloted quota

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Current Topics

ECONOMIC CONVENTION ON INFLATION IN CALCUTTA.

The Economic convention on inflation concluded its three-day session on 29th. August, 1948. The main resolution of this convention have been framed by a Sub-Committee, composed of well-known economists.

The convention considered that anti-inflationary measures in the final analysis, boil down to measures aimed at restoring reasonable balance between the stream of money income and the stream of goods. The unbalance between the two has been growing since the close of war. The inflationary increase in the stream of money income is made up of three principal sources:—

(A) Money hoards concealed from the tax authorities and the accumulated inflationary funds held in the form of bank deposits, Government Securities including Treasury Bills and liquid cash.

(B) Deficit financing by the Government and

(C) Increase in the velocity of circulation of money in restoring a reasonable balance between the stream of goods and the stream of money income. The first step that Government must take is to put a stop at once to deficit financing. But this measure by itself would be inadequate. The convention further recommend that (1) maximum limit should be placed on currency notes. An expert committee should be appointed to fix this limit in accordance with the principle of cash requirements of the different incomes and occupational groups on this basis of price level.

(2) Currency hoards should be unearthed and above a certain limit immobilised. In this end the Government should call in all existing currency notes and issue fresh notes in exchange for the portion that will be allowed to go into circula-

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with minimum trouble without undergoing the hardships of the previous system. For that purpose Government should not hesitate to issue a large number of licenses than usual.

The re-control should include in it daily necessities of life such as cereals, vegetables and mineral oils, sugar, cloth, salt, and coal. In some cases, control over mere wholesale and retail prices will be enough. In case of such important commodities as food cereals and cotton textiles, control will have to be extended to both wholesale and retail distribution as well. One of the lamentable features of present control system of cement and iron is that these essential building materials are scarcely available at controlled rates to small consumers and they have to fall back upon black-market. We strongly feel there should be presently an end of this sorry state of affairs in the revised control system.

We strongly hope, control system, more organised and more rigorously enforced, may serve as an effective short-term measure of fair equitable distribution. And as soon as the supply position improves with increased production, we may swing back to ultimate decontrol.

tion. Interest may be paid on the amount immobilised but it should be in the form of deferred payments.

(3) The Reserve Bank should be given power to restrict credit expansion.

(4) A scheme of compulsory saving should be evolved and made applicable to all income earners above a certain minimum level of income to be collected at a graded rate.

(5) Essential commodities such as food grains and cloth should be controlled and rationed.

(6) On the goods side, all maladjustments inclusive of transport and other bottlenecks and malpractices in administrative machinery and import controls wherever reasonable should be relaxed.

The convention added that these conventions should not be construed as implying any discouragement to normal investment.

By another resolution the convention expressed the opinion that there should be no question of scaling down of sterling balances which are hard-earned assets. These sterling balances were accumulated as a method of war finances and are among the causes of inflation in India. A contribution towards the solution of inflation would also be the purchase of British investments in India as has been done in Canada and Australia.

The convention recommended as its immediate steps (1) creation of an economic civil service, (2) a secret judicial mission to deal with corruption, (3) holding of periodical enquiries of the assets of Government employees, (4) creation of an economic general stuff, (5) framing a small council of economic experts to advise the Government in the setting up of a departmental advisory board.

A copy of the resolution has been forwarded to Central Government for the consideration of the feasibility of the above recommendations. A co-operative endeavour and constructive suggestions from different quarters will go a long way to solve this crisis.

The Economic Convention, it is obvious, have a correct grasp of the problems facing us. And the concrete proposals that have emerged out of their deliberations deserve the careful attention of the Central Government.

TOBACCO TRADE IN INDIA.

The British Board of Trade have decided to make larger purchases of Indian tobacco. This is an event of immense significance to the industry of Indian tobacco as a whole inasmuch as it will give a fresh stimulus to the progress and development of this industry. The volume of trade has already increased from 17 lakhs to 70 lakhs in course of four years. And there is every possibility of further increase in view of the latest decision of of the British Board of Trade.

India Government, too, are completely aware of its possibilities and are taking the necessary steps for effective markettting organisation at home and abroad. And this is quite in keeping with India Government's policy of vigorous export drive. Indian Tobacco Committee have already appointed a Liaison officer with the sole task of popularising Indian tobacco in European markets. Vigorous propaganda and wide publicity, we are sure, will pave the way for rapid expansion of this trade. The appointment of Jag Jiwan Singh for effective propaganda in favour of a single commodity in foreign markets marks quite a new development in our export organisation. And we have reasons to hope that Indian tabacco will, in course of time, become a hard currency earner, if Europe meanwhile learns to take to Indian tobacco.

The future possibilities of Indian tobacco will, however, depend on the extent to which we improve upon our present production. As a matter of fact, there remains wide scope for better improvement in organisational affairs. The growers, it is obvious, are lamentably lacking in organisation.

If the industry is to make any headway, the growers must firstly organise. They can do so by adoption of better harvesting and curing methods, by the use of good seeds, proper cultivation, careful standardisation of grades and packing, by the installment of regulated market, by a reduction in the cost of distribution and thus promote an all-round self-sufficiency.

GHEE PRODUCTION IN INDIA.

The annual production of ghee in India is estimated at over 8 lakh tons valued at Rs. 77 crores according to the ghee marketting report issued by the Directorate of Marketting and Inspection of the Government of India. Of this quantity nearly 62 % is produced in Indian provinces and and the balance in states. 3/5th. of the ghee production is concentrated in Northern and Western India and the remaining two-fifth is scattered in the rest of the country. Taking the country as a whole India produces 8.9 maunds of ghee per square mile, 21.4 maunds per village and 3.6 maunds for hundred persons.

Of the total ghee production 30 per cent. is retained by the producers for annual consumption and 70 per cent. is marketted. These percentages have, however, slight variations.

India imports about 66,000 maunds of Ghee mostly by land frontier routes from Nepal, but the trend of imports during the last few years has shown a downward tendency. India also exported about 6,000 maunds valued at a little over Rs. 30 lakhs mainly to Straits Settlement, Burma, Federated Malay States and to Africa. The report states that there are possibilities of expanding the export market for ghee when normal conditions return. But this present production should be encouraged when present production is increased beyond self-sufficiency and only ghee of good quality should be exported.

To enable consumers to obtain supplies of pure ghee the Directorate of marketting and inspection inaugurated its Agmark scheme in 1937, which has progressed steadily.

Some of the other main recommendations are as follows:—

1. The production and consumption of ghee should be accelerated by increasing milk production and by the introduction of improved methods of milk fat extraction under village conditions.

2. The units of sale should be standardised by a rigid enforcement of Weights and Measures Act.

3. A regular system of controlling ghee markets should be introduced by the establishment of regulated market and cheap credit facilities should be provided to producers by organising co-operative ghee sale societies.

4. To ensure uniformity in the different provinces in the enforcement of food control lands. Provincial Governments should promote central legislation for the hygienic control of food production, distribution and sale.

The above recommendations, if strictly adhered to, will, we hope, produce the desired consequences. State regulation of a commodity of such high nutritive value is highly desirable from considerations of public health and hygiene and its vast trade possibilities.

COTTAGE INDUSTRY BOARD.

Cottage Industries are dying a natural death owing to lack of proper organi-

sation, co-ordination and suitable Government assistance. The Central Government's announcement that it will shortly constitute a cottage industries board marks a new era in the organisation of village industries. Cottage industries, at present, come within the purview of the Industries Department. But the creation of a separate board will in no way lead to any clash or duplication of administrational affairs. And the functions of the board will be mainly those of assistance and co-ordination of cottage and small-scale industries. The board, however, have not yet decided upon the distinct lines of their actions. It will also remain within the scope of this Department to advise on the marketting of the products of cottage and small-scale industries.

Revival of these cottage and small-scale industries will, we hope, give a new lease of life to our rural economy and will at the same time go a long way to mitigate the post-war crisis to a considerable extent. We hope, henceforward, Government's foremost will be to encourage small-scale industry to the maximum possible extent.

MICA TRADE IN INDIA.

It is extremely unfortunate that Indian Mica Producer never gets a square deal for his products owing to lack of proper organisation. He is exploited in various ways by the shippers and foreign trade interests. And one will simply wonder at the wide gulf between the prices paid by by the user of Mica and the price received by the Indian producer. We therefore, feel that there should be presently an end of this inequitable and sorry state of affairs. The gap should be narrowed down in the quickest possible time.

With that end in view, Government of India set up an Interim Marketting Board. The Board, have already given anxious consideration to this problem. And certain concrete proposals have evolved out of their deliberations. Firstly they propose to set up a marketting Board organisation whose primary function will be to keep a continuous watch over the developments in foreign trade and thus help the Indian mica trade secure the best terms possible for Indian interests. The contemplated control Board whose constitution of functions will be formulated later on, will act as the guardian of Indian interests. Secondly the Board recommend that import of Brazil mica will have to be stopped altogether. Thirdly the Board strongly feel that the practice of shipping mica abroad on a consignment basis has tended to weaken the country's bargaining power in external markets. The Board therefore recommend that the practice should be completely discontinued, leaving no scope for exploitation by foreign sellers and buyers.

Madras Government should give particular interest in this direction, South India being the chief centre of mica resources.

MERCANTILE MARINE FOR INDIA.

We are glad to find that India Government have already taken a vigorous initiative in securing rapid expansion of mercantile marine. Government policy with regard to mercantile marine will have far-reaching influences on our national economy. Firstly this policy will remove one of the greatest strangleholds on sound development of our coastal and overseas trade. Her continual dependence on foreign shipping companies has been so long weakening her economic position. India's coastal and foreign sea-borne trade is sufficiently large in volume to keep an Indian mercantile busy. Secondly a mercantile marine may serve as a naval auxiliary of a second-line defence in times of war. Besides, the

proper development of a mercantile marine will open new avenues of employment to Indians.

Main effort is now being directed towards a substantial increase in tonnage owned by Indian shipping companies. The Government are already rendering assistance to Indian companies in sponsoring the building and purchase of ships in foreign countries. We are glad to note that 1.5 lakhs of tonnage will be doubled in course of three or four years and strongly hope that shipbuilding industry will grow from more to more under the protecting wings of our national Government. Medium-sized ocean-going vessels are already being constructed in Scindia Shipyard, Vizagapatam.

Expansion of mercantile marine will have to be always undertaken with reference to our commercial and defence requirements. Indian tonnage was so long confined to coastal trade but now with increased expansion it ought to extend its frontier towards overseas trade.

Efforts are now being made to enable Indian ships to enter into over-seas-trade. Admission of two shipping companies Scindia Steam Navigation, and Indian Steamship Company to India-U. K. Conference is a significant pointer in this direction.

In order to speed up acquisition of tonnage and achieve all-round development, India Government have announced to set up three shipping corporations with a capital of 10 crores each, Government subscribing 51 per cent. of the aggregate sum. And each corporation will operate with a fleet of approximately 10.00 tons.

Provision has also been made for training facilities of new cadets.

MANURE AND MANURING.

CONSIDERABLE attention has of late being accorded to the subject of manures by our agricultural experts and there cannot be two opinions as to the desirability of utilising a greater amount of manure in agricultural operations. More than seventy per cent, of Indian population derives their livelihood by agricultural occupations. It is a fact which goes without contradiction that notwithstanding the far from satisfactory conditions of the people, no systematic attempt is made to make two blades of corn bloom where only one grew before. Leaving aside the question of the vast area of land lying waste and awaiting development, one is grieved to find that average yield of the principal crops of India falls far short of the international average. To cite a few examples, in Bombay and United Provinces the yield of wheat per acre is only 1,250 lbs. as compared with 1,973 lbs. per acre in the United Kingdom and 2,874 lbs. in Belgium. Average Indian yield of barley, sugar, etc. leaves much room for improvement. Even the average production of rice, it is stated, in India is half of what it is in Japan. And this is in spite of an immense store in the country of manures of all conceiveable sorts.

In view of the grave situation arising out of low production of agricultural commodities in recent years the campaign of "grow more food" becomes a maxim in all countries to stem the tide of deficiency. But the success of this campaign depends for its fulfilment upon the extensive manufacture of manures of all types and accurate knowledge about their application to the soil for increased yield. With this end in view we have proposed to discuss in this article in detail as far as possible the manufacture of principal fertilisers and their applications to crops.

SOILS.

Before considering a specific fertiliser, the agricultural value of the soil must be reviewed first.

Soils consist of mineral matter derived from rocks, the calcium carbonate, calcium phosphate, and organic matter obtained from marine and other organisms, the soil water, and the residues of materials grown on the soils.

The main soil is generally divided into three classes: clay, loamy and sandy. In addition to these classes are marls containing from 5-20 per cent. calcium carbonate, the rest being silt and clay; calcareous soils, containing more than 20 per cent. calcium carbonate; and pasty or *humid soil* which have more than 20 per cent. humus. Sandy soils contain less than 6 per cent. of clay, loams from 6-15 per cent. clay, and clay land from 15-25 per cent. clay, but sometimes considerably more.

PROPERTIES OF SOIL.

The general characteristics of a clay soil are fine texture and cohesion of the particles. It absorbs moisture from the air and draws it from the lower soil by capillary attraction, and retains water obstinately. If worked while wet it becomes hard and intractable. A sandy soil has little adhesion of particles, attracts little or no moisture from the air, and allows water to percolate through it readily, thus causing loss of fertilising elements by leaching. It absorbs and retains heat well and is dry and warm, easily worked and will not bake. Its power of drawing moisture from below is about two-thirds that of clay. Soils intermediate between sand and clay take, in a modified way, the main features of both.

For purposes of agriculture the circulation of moisture in the soil and the tem

perature are of greatest importance. A soil having clay as its predominant constituent holds its water almost stationary, and when subjected to evaporation, through heat or drying winds, bakes badly. The soil water contains fine particles of clay in suspension and these are drawn to the surface and deposited by the evaporation of the water, thus making the upper layer no longer porous. Evaporation ceases. The soil moisture, only a few inches below the surface, remains quiescent, and the closely packed upper layer also excludes heat and gases, the soil becomes cold, and those chemical processes necessary for the preparation of plant food in an assimilable form cease.

The best known remedy is application of lime which throws down the suspended clay in the form of small granules thus opening the pores of the soil and enabling a free circulation of water and the admission and action of gases and sunlight. With sandy soils evaporation does not bake and the movement of the soil waters is accelerated but there is danger of exhausting the supply as the power of capillary attraction in this case does not greatly exceed a depth of 20 inches. These soils give free play to the action of gases and sunlight and maintain a temperature favourable for vegetation.

Excessive evaporation is prevented by thorough tilling; a surface layer of finely pulverised earth a few inches deep arrests evaporation while it still-maintains a far degree of soil porosity and consequently the admission of gases and sunlight is not retarded. The action of chemical fertiliser is more prompt with sandy than with clay soils. Sandy soils however must be kept at work so to speak. They lose fertiliser elements rapidly through leaching if not protected by vegetation. As to temperature, a dark coloured soil, other conditions being equal, is usually warmer than one of lighter colour; a soil having its percentage of sand high will rise in temperature slowly but will retain the heat longer than either warm or a clay soil; a wet (clay) soil is uniformly a cold soil.

FUNCTION OF SOIL MOISTURE.

Evaporation of soil moisture cools the soil as the heat necessary to vaporise the water is drawn from the land. Evaporation, however, draws the moisture from below for very considerable depths and the fertilising matters suspended or in solution are brought by this process within reach of the roots.

These fertilising elements are not gained, but they are kept constantly in circulation; at night they sink only to rise again when the evaporation commences with the succeeding sunrise. By this circulating system the fertilising elements are brought within the reach of the plant roots and are utilised; were it suspended, the application of manures would have to be increased manyfold, as the quantity of the nutriments in the immediate vicinity of the plant itself would have to supply all its requirements; and as the roots of plant in ordinary farming practice occupy probably less than 5 per cent. of the total space, it follows that the efficiency of one ton of fertiliser would require an application of 20 tons to accomplish the same results with suspended circulation of soil water.

NATURE AND FUNCTION OF MANURES.

A manure is a substance designed to supply one or more of the essential constituents of plant food, and, where necessary, to improve the physical condition of the soil to which it is applied. The essential constituents of plant food must contain the elements carbon, hydrogen, oxygen, nitrogen, phosphorous, sulphur lime, magnesia, and iron and probably silicon, chlorine and sodium. Of these, carbon, hydrogen and oxygen and some

f the nitrogen are derived from air and ain, most of the nitrogen and the remaining elements being obtained from the soil. Almost every soil contains enough lime, magnesia, sulphur, iron, silicon, chlorine and sodium for the growth of a full crop, but nitrogen, phosphorus, and potash are often present in but small quantity, and become exhausted by the removal of farm produce.

It is for this reason the addition of manure is indispensable so as to supply the deficiencies of these three constituents. But as some crops either contain in excess of one or other of these or are better able to obtain some one or other of them from the soil, than are other crops, it is most economical to apply a special manure to meet the needs of such crops.

All manures have a complex action in the field:—(1) Feeding the crop; (2) altering its habit of growth, its feeding value, its qualities, market price, etc.; (3) acting on the soil and affecting tilth moisture holding capacity, draft of implements etc.; (4) making the soil acid or alkaline according to the nature and circumstances of the case.

Manures are used in practice for the following reasons:—

(a) To supply crops with readily available food.

(b) To enable crops to make the most of their short growing period by supplying available food just when most needed.

(c) To give each crop just what it has most difficulty in getting for itself.

(d) To keep up the original fertility of the soil.

These reasons apply most directly to crops grown on arable land in ordinary rotation.

CLASSIFICATION OF MANURES.

The word manure in its general sense possesses more far-reaching meaning than it is supposed to stand in for trade and industry. Manures may be classified into three classes, viz.'—

1. Natural or organic manures.
2. Artificial or chemical manures.
3. Special or compound manures.

NATURAL OR ORGANIC MANURES.

This class includes all types of farmyard manures, litter, liquid manure, blood, animal refuse, human excrementitious matter, fish guano, oil cakes, etc. In fact all kinds of organic refuse whether of vegetable or of animal origin may be employed as manure.

FARMYARD MANURES.

Farmyard manure is the mixture of the liquid and solid excrements of farm animals with straw, etc., used as litter.

The liquid portion should be soaked up by the litter, so that the latter may have moisture enough to allow of its decomposition, instead of being dried, when it is rendered almost useless. Farmyard manure deteriorates by violent heating, but partial decomposition by slight fermentation before adding it to the soil will render its consituents more soluble.

It is regarded as the typical manure by farmers and others, because it is supposed to contain all the ingredients required for the growth of crops, and also because it causes a certain amount of disintegration of the soil, as well as warming certain lands.

For improving the permanent fertility of soils, farmyard manure is the most important of all fertilisers. In addition to its manurial properties, it has valuable physical effects upon the texture and water holding powers of the soil, and in dry seasons these may count for more than fertilisers towards ensuring good crops. It restores humus in the soil, gives cohesion to sandy soils, and renders clayey soils more porous and workable.

The storage of farmyard manure presents considerable difficulties, for when it is kept under the best conditions there will often be a loss of 15 per cent. of its nitrogen, and can be as much as 40 per cent. under ordinary methods of storage, and are kept in covered sheds, with sufficient under bad conditions it may lose 75 %.

The storage is simplified if the cattle are kept in covered sheds, with sufficient litter to absorb the urine, and there is little or no drainage. The dung is well pressed together, and this means that fermentation is reduced to a minimum.

But in the open the case is entirely different, and wet weather will account for very heavy losses, in that it will wash out much of its most valuable constituents. A system of drainage is sometimes practised, and in the case of dairy cows kept in stalls, the liquid manure is highly valuable. It is applied during showery weather, or diluted, for the strong liquid tends to burn foliage. It is stated that ammonium bisulphate added to liquid will prevent to a large extent losses of nitrogen.

Farmyard manure thrown out into the open involves heavy losses, and if it is impossible to keep it in dungsheds, or other covered places, it should be drawn out and made into heaps. The heap should be made by building it up, pressing it down tightly, and covering it with a foot of earth. It is an advantage to form a sloped heap, so that the rain may run down instead of into the mass. This will preserve to some extent its manurial constituents. Exposure to weather under any condition means considerable loss, even greater than an analysis will show.

Even when stored under the best conditions farmyard manure losses a good deal of its most valuable plant food, and under bad conditions the loss may be very great. It must be remembered that the loss first affects the most available material, and is proportionally greater in the case of cake-fed manure than in material of a lower quality. It therefore follows that if animals are well fed to produce good manure, extra precaution must be taken to insure against loss in its storage.

It is wasteful to turn heaps of manure to get at the well rotted material for top dressings. Directly the heap is broken it should be used.

Well-rotted dung is richer and more active than coparatively fresh, undecomposed material. It is, however, necessary to remember that manure cannot be rotted or stored without serious loss, and while the rotted material may contain more plant food than an equal weight of fresh manure, it contains actually less than the fresh manure from which it is made.

Gypsum, superphosphate, and kainit as well as other materials have at times been recommended as agents suitable to conserve or prevent loss of the constituents of the manure. The substances have sometimes been applied with success, but it is generally recognised that under most conditions, they are open to objection.

As farmyard manure must first decompose in the soil, its full benefit may only be felt after some time if the land has been well cultivated, drained, and limed. The duration of its action depends upon the nature of the soil. In open soils it is used more rapidly, but on the heavier types, it may take years to obtain the full value.

Farmyard manure supplies plant food, and one of its chief properties is to restore much of the nitrogen previously taken from it in the form of straw, as well as some phosphoric acid and potash, but to obtain the best results artificial fertilisers must be used in conjuction with it. It has, however, a marked effect upon the mechanical condition of the soil. Heavy soils

are poor in lime and phosphoric acid, although they are relatively rich in potash and nitrogen.

When used for arable purposes, farmyard manure is necessary to break up the soil into a more open condition.

GREEN MANURE.

When farmyard manure is scarce, green manure is a suitable form in which to supply organic matter to the soil to keep up the supply of the humus. The method consists in growing special crops, either alone or intermixed with others, for the purpose of digging or ploughing into the soil in a green state, when they have reached a suitable height or before flowering. This mode of enriching the soil is considered to be one of the most economical as well as efficacious, the fresh vegetable matter being returned to the soil with greater advantage than when it has been decomposed, and much of its goodness has been lost in the process of rotting and fermentation. For improving the condition of light sandy soils especially, green-manuring is of the greatest value.

Whilst all plants, weeds included, are useful for adding organic matter to the soil, when dug into it in a green state, yet all are not equally valuable. Although good results are achieved by the use of non-leguminous plants as green-manure, yet it is a common belief that only leguminous species have the power of utilising free nitrogen, which they effect through the agency of the bacteria utilising free nitrogen, which they effect through the agency of the bacteria nodules on their roots.

In selecting plants suitable for green-manuring, those which are more or less of a harbaceous character and rapid growth, capable of forming a good cover on the ground in a short space of time, should be chosen. The following are recommended for the purpose: Groundnut, sunn-hemp soyabean, indigo, dhaincha, cow-pea, etc.

LIQUID MANURES.

Although this term is generally considered to imply the drainings of dung-heaps, urine, etc., yet almost any manure may be applied to the soil in a liquid state. Manure of this description, though most beneficial to vegetable and other crops, should only be used when the plants are in a healthy state of growth. It can also be very profitably applied to composts, to induce rapid fermentation in them. This manure has a great advantage over solid, organic matter. It is claimed that liquid being stronger, quicker of action, and being more evenly diffused over the land, most of the highly concentrated artificial manures are doubtless applied in solution, but this is not always practicable. Liquid manure may be made by adding a small portion of some concentrated fertiliser to a can of water, and applied at once to the plants it is intended to stimulate. This is a ready and clean method of preparing it, but one which requires some caution in guarding against the dose being too strong. All chemical manures intended for use when dissolved in water should be tried first in a weak solution, and the strength increased gradually if results warrant it. Liquid manures, as already stated, are most effectually employed when the plants are in an active state, yet in want of a stimulant for assisting the development of their crops, or of sustaining their growth.

It is mentioned above that the principal liquid manures consist of the liquid that run from the manure heaps and the urine of the farm house. This is a highly decomposable articles giving off ammonia if it is kept in tanks for a long period thereby loses its most important fertilising constituent. Under these circumstances, a quantity of diluted sulphuric

acid should be added to the liquid until no ammonia is evolved. The sulphuric acid "fixes" the ammonia, or converts it into ammonium sulphate.

Liquid manures have proved beneficial in the case of root crops, and for grass, but not for cereals.

In collecting liquid manures, it is better to preserve them in water-tight tanks —the addition of rain water lessens their value.

COMPOSTS AND MIXTURES.

Compact is a mixture of different soils, farmyard manures, and decaying vegetables of animal matter; whilst a combination of fertilisers i.e., artificial manures, is generally known as mixture. The combined effect of a suitable mixture containing all the chief constituents of plant-food is more marked, and the application more economical, than if the different ingredients were applied separately. A more even distribution is also assured by a mixture, especially in the case of very concentrated fertilisers which have to be applied in very small quantities. These, if applied in an unmixed or undiluted state, may be actually injurious to the plants.

While many fertilisers may be mixed together with advantage, others are quite in caking, rapid decomposition, and loss of valuable material. Thus sulphate of ammonia, lime, bones, guano and basic slag should not be intermixed; kainit, lime and basic slag may be mixed just before use; nitrate of soda, sulphate of ammonia, bones, kainit, and guano may be mixed at any time, provided the mixture contains also an organic base, as fish guano or castor-cake, etc.

For potting plants, useful composts are prepared by mixing loam or good ordinary soil, leaf-mould, well decomposed manures, and a small proportion of fine sand charcoal; the proportions used should vary according to the nature of the plants for which they are intended and the texture of the ingredients, but, generally speaking, they may be in the proportion of 2, 1, 1, ½, . . ., respectively.

A useful general mixture follows:—

Sulphate of ammonia	235	parts.
Blood meal	202	„
Superphosphate	101	„
Bone meal	34	„
Sulphate of potash	100	„

Quantity per tree: Trees from 2 to 4 feet in height, ½—1 lb. each.
„ „ 4 to 6 „ „ 2—3 lbs. each.
„ „ 6 to 8 „ „ 3—4 lbs. each.

Apply the manure in a circle round the tree, not nearer than 3 feet from the stem for small trees. Forking should be deep, but without turning the soil over, so as to injure the surface roots as little as possible.

POULTRY MANURE.

It is a richer fertiliser than farmyard manure, and as its nitrogen is readily available, it is a quick acting manure.

The composition of this manure, however, varies and depends upon the type of bird, fattening birds giving a richer dung than laying ones.

The average nitrogen content of fresh acid 1.0 per cent. and the potash 0.55 per fowl dung is 1.9 per cent. the phosphoric acid 1.0 per cent. and the potash 9.55 per cent. The dried material contains 5.2 per cent. of nitrogen, 2.5 per cent. phosphoric acid, and 1.4 per cent. potash.

Peat moss, sawdust, or gypsum are sometimes added to the material to dry it, but fine soil is quite as effective.

It should be kept in a similar way to farmyard manure, by covering it with earth.

A good poultry manure is as effective as a quarter of its weight of sodium nitrate. It has given good results when compared with other nitrogenous manures, especially with the addition of superphosphate.

It is valuable as a forcing manure for green crops as a top dressing, and is also useful for fruit trees, tomatoes, and strawberries.

FISH GUANO.

Fish guano is simply dried fish. It contains about 1¾ per cent of nitrogen and 1 per cent. phosphoric acid. It has been used with success as a manure for root and cereal crops. It is made on a considerable scale from various kinds of fish refuse. In making guano, generally oily fishes like cod, herrings, sprats, etc., are boiled and pressed for the sake of their oil and the residue is dried, powdered, and sold as fish guano.

OIL CAKES.

In this country oil cakes are generally used as cattle food, but some of them, for various reasons, are unsuitable for this purpose. These oil-cakes as well as damaged cakes are employed as fertilisers. They have been applied considerably in top manuring, and for general use on light soils, when a slower-acting fertiliser is prepared. They usually contain from 4-7 per cent. of nitrogen, 1-3 per cent. of phosphoric acid, and 1-2 per cent. potash.

RAPE CAKE—This cake before using for manuring should be ground. Rape cake decomposes slowly in the soil, yielding from 5 to 6¾ per cent. of ammonia, and 3½ to 5 per cent. of phosphates of lime and potassium. Rape dust forms an excellent constituent of manures for wheat and potatoes.

MUSTARD CAKE—This is produced from the mustard and also often forms good and cheap manures for cereal and other crops. It contains about 5 per cent of ammonia, or nitrogen equal thereto.

CASTOR CAKE—This substance is the residue of the castor oil industry. Like other two cakes mentined above, castor meal gradually decomposes in the soil. It contains on an average of 4-7 per cent. nitrogen, 1.5-3.5 per cent. phosphoric acid, and 1.9-2.5 per cent. of potash.

COTTON SEED MEAL—A product obtained by grinding the cake which is left when the oil is pressed out. It is mainly used for its nitrogen content, and contains from 7-10 per cent. of nitrogen, 1-3 per cent. of phosphoric acid, and 1.5-3.0 per cent. of potash.

LINSEED MEAL—This material contains from 3.5-4.5 per cent. of oil. The contents of its fertilising ingredients are about 3 per cent. nitrogen, 1 per cent phosphoric acid, and 1 per cent. of potash.

The plant food in cotton seed meal is chiefly nitrogen, so that its fertilising value depends upon the quantity of introgen present. It contains however. an appreciable amount of phosphoric acid and potash.

In using cotton-seed meal as a fertiliser it must be borne in mind that it is essentially a nitrogen provider, hence if the soil requires phosphoric acid and potash as well as nitrogen, the meal should only be used in connection with some form of fertiliser furnishing these other materials.

NITROGENOUS FERTILISERS.

Nitrogen is the most important of all plant foods, and the use of nitrogenous fertilisers usually gives the most profitable results.

Nitrogen is not taken up by the plant as such but has to be in combination before it can be used for the purpose of

supplying nutrient material to vegetable life. The form of combination which appears to be the most suitable and readily available, is as nitrate, and these compounds are quicker in their action than any other type of nitrogenous fertiliser, the next in order being ammonium salts, which are rapidly changed into nitrates in the soil. Finally, there are the slower acting materials such as animal and vegetable matter, which breaks down gradually into nitrate, by action of soil bacteria.

Nitrogen judiciously applied promotes growth and gives power to the plant to resist disease and attacks of insect pests. An excessive amount of it will cause the plant to become limp, rendering it susceptible to insect pests. The other main function of nitrogen appears to be in the greater development of leaf and stem.

Hence those crops that are value for leaves only such as cabbages, tobacco, mulberry, betel (pan), tea, etc., are benefitted by nitrogenous manures. For all other crops, except leguminous crops, the application of nitrogenous manures at an early stage of growth after germination gives a good start.

SODIUM NITRATE.

The commonest nitrate used as a fertilising material is sodium nitrate. This substance occurs naturally in Chili, where it forms deposits.

The raw product is known as caliche, and varies greatly in its composition. It is a mixture of sodium nitrate with a little potassium nitrate, a larger amount of sodium chloride, and often sodium sulphate and magnesium sulphate.

The commercial salt is obtained by crushing the nitrate ore, boiling it up in water, and recrystallising the salt from the solution. After crystallisation the mother liquor is worked up for iodine by precipitation with sodium sulphite and bisulphite. The crystallised salt contains 95 per cent or over of sodium nitrate, with smal amouts of sodium chloride, sodium sulphate, magnesium sulphate, and in som cases a little potassium nitrate.

The salt containing 95 per cent. sodiun nitrate is equal to 19 per cent. ammonia which is eqivalent to 15.6 per cent. nitrogen. A new process for treating the nitrate ore consists of freezing out the pure intrate of soda from the solution. This method is stated to considerably reduce the cost of production.

As this fertiliser is ready to be absorbed by the the plant, it is valuable in cold and wet conditions, to ensure an early growth. For this reason it should be applied as a spring dressing, but not before the crop has sufficiently grown to assimilate it, as it is easily washed out of the soil and lost. It should only be given when needed. Young plants suffering from insect pests are benefitted by the application of this fertiliser, which helps the plant by rapid growth to weather these early troubles.

Excessive amounts prolong the period of growth and favour the production of foliage rather than seed. They also tend to produce large roots of poorer feeding value than those grown with less nitrate, and applications for the early ripening of seed or fruit should be given with caution.

In storing sodium nitrate, it must be kept dry, as in a moist atmosphere it tends to become lumpy and must not be applied in this condition.

It is poisonous to animals and cattle should not have access to it. The amount of this fertiliser to apply will vary for particular crops and conditions, but usually from ¼-1 Cwt. per acre is applied in the spring to creal crops.. For meadow from 2-3 Cwts. per acre is often applied in two or three dessings. Cabbage ca

take liberal amounts, and 4 Cwt. or even more may be used for early cabbage.

AMMONIUM SULPHATE.

When organic nitrogenous materials are destructively distilled, the nitrogen is to a large extent expelled as ammonia, and when coal is distilled for coal gas ammonia is a valuable by product obtained in the purification of the gas, and this is an important source of the supply of ammonium compounds.

Formerly the ammoniacal solution was directly neutralised with sulphuric acid, but this method introduced certain impurities into the product which are injurious to plant life.

In modern times the nitrogen fixation prcesses are accounting for large amounts of ammonium sulphate. One of these processes is known as Haber process. This consists of the direct synthesis of ammonia from nitrogen and hydrogen, and is carried out by bringing a mixture of the pure gases in the proportion of 1 volume of nitrogen and 3 volumes of hydrogen under a pressure of 200 atmospheres in contact with a catalyst such as iron at about 600°C.

About 8 per cent. by volume of ammonia is produced and this is removed from the gas by washing with water.

Ammonium sulphate is also produced by interaction with calcined gypsum and carbon dioxide. The ground calcined gypsum is put into a vat with water and the washed ammoniacal water from previous operation. Ammonia gas is passed into the suspension until 2-3 per cent. ammonia is in the solution. Carbon dioxide is now passed in at 60°C until the solution contains from 0.3-0.5 per cent. ammonia. The Badische Co. use a suction filter to obtain the solution free from the suspended calcium carbonate which is formed. The Otto process consists of a special reaction column, gypsum and water being introduced at the top, and the ammonia and carbon dioxide are forced in together under pressure at the bottom. The liquid, after filling troughs in the column, flows over and falls to the bottom in the form of a hot saturated solution with calcium carbonate suspended in it.

The mass is cooled, and consists of ammonium sulphate crystals and calcium carbonate. The supernatant liquid is returned to the top of the column with gypsum, and the ammonium sulphate is separated from the mixture by using small amounts of water, filtering, and recrystallising.

CALCIUM NITRATE.

This material is known as Norwegian saltpetre, as it is a product of the Norwegian nitrogen fixation industry. The process consists in sucking air into a furnace chamber containing a flaming ore produced between copper tubes cooled by water circulation, at a temperature of 3000°-3500°C. The gases produced contain from 1.5-2 per cent. nitric oxide. They are cooled when nitric oxide is converted into nitrogen peroxide. The gases consisting of about 2 per cent. nitrogen peroxide and a little nitric acid are passed through absorption towers where nitric acid and some peroxide are absorbed by water. Nitric and nitrous acids are formed, and eventually nitric acid. The gas is afterwards passed into a 2 per cent. caustic soda solution to absorb any remaining acid. About 10 per cent. only of nitric oxide and nitrogen peroxide remain in the gas before passing it into the alkali. The dilute acid solution is concentrated, and treated with limestone, and the liquid evaporated until its specific gravity is 1.9 when it is run on to shallow trays. It is then ground up as a coarse powder, which usually consists of a basic nitrate containing about 75 per cent. calcium nitrate and gives approximately 13 per cent. nitrogen.

The acid can be used to make sodium nitrate by neutralising with soda ash, or ammonium nitrate by neutralising with ammonium hydrate. The calcium nitrate is deliquescent, and in consequence must be used directly the airtight tins are opened.

It has been suggested that if mixed with 2½ time its weight of dry or calcined brick or with calcined gypsum, it will be removed suitable for spreading on the land and prevents caking.

Calcium nitrate is used in the same amounts as sodium nitrate, over which it has certain advantages in that it gives lime to the soil and does not make clay soils sticks.

CALCIUM CYANAMIDE.

Calcium cyanamide is also a fertiliser made from nitrogen of atmospheric air; which is passed through coarsely ground heated calcium carbide. As fertiliser has several disadvantages. It neither suits lumic acid soils, peaty soils, nor light sandy soils but it gives good results in all loamy soils of average fertility. Owing to the formation of dicyanamide this manure ought to be spread at 8 days before sowing and covered in afterwards in not too superficial manner. The action of cyanamide is weaker than nitrate of soda but as the unit nitrogen is supplied cheaper by the this manure, a greater quantity can be used to restore the balance.

Calcium cyanamide is not soluble in water, and is decomposed in the soil into urea, then into ammonia and calcium carbonate, the ammonia being finally converted into nitrate for plant food.

PHOSPHATIC MANURES.

These manures are indispensable for certain crops, and have a marked beneficial effect upon soil bacteria. It is stated that an actual deficiency of phosphoric acid can cause more injury to crops than an equal deficiency of nitrogen.

The particular value of phosphatic fertilisers lies in their property of maturing roots and stems, by producing woody growth. They specially develop root formation, enabling the plant to take nourishment from the soil in the early stages of its life. For this reason they are valuable on clay soils where roots do not form readily.

In the latter stages of plant life they increase the flowering and fruiting tendencies of plants, also increase the absolute yield of seed and roots and hasten ripening.

Phosphates are indispensable for crops of the pea and bean type, and are valuable for cabages. They are generally needed on clay lands than the sandy ones.

They greatly improve all root crops such as potatoes, turnips and mangolds, and barley responds to their application.

The best results with phosphates appear to be when employed in conjunction with farmyard manure or similar material.

The main sources of phosphatic fertilisers are phosphate rock, super-phosphate, basic slag, and bones.

MINERAL PHOSPHATES.

Phosphates occur in soil and racks chiefly in the form of tri-calcium phosphate, mixed with various impurities. If it is mixed or combined with calcium chloride or fluoride it is termed apatite. Such a deposit is found in abundance in the district of Hazaribagh and is of considerable value to agriculture. Tri-calcium phosphate more frequently occurs mixed with calcium carbonate and silicates of iron and aluminium, and in this form it is known as rock phosphate. Large deposits of rock phosphate do not appear to occur in India, though considerable quantities are found in South India.

Nearly all the mineral phosphates actually received are used for the manufacture of superphosphate. The mineral phosphate, having being ground, is treated with sulphuric acid, and is run into a den where the reaction is completed.

A particular type of fertiliser which proved useful is called basic superphosphate of lime. It is very dry and fine and easily distributed.

BONES.

Bones contain from 45 to 55 per cent of phosphates chiefly as tricalcium phosphate, and partly also in the form of magnesium phosphate. Bones containing 3½ to 4½ per cent. of nitrogen, 3 per cent of calcium carbonate, and 4 per cent of other ash (including silica), may be regarded as the light manure.

Bones are but rarely used for manure in their raw condition as they are received from the collectors. As they contain fat their decomposition in the soil takes a long time. So the first treatment of the bones received is to steam them under a pressure of 15 to 20 lbs. in order to melt and remove the fat. In some cases the fat is extracted even more thoroughly by the action of benzene. The boiled or steamed bones thus obtained are some times crushed into ½ inch or ¼ inch pieces, though there is no longer much demand for material so coarse; more generally they are ground down into "bone meal." A really fine powder is, however, rarely obtained, because the cartilage interferes materially with the disintegration unless special methods are employed. It is this crushed material which is also treated with sulphuric acid for the manufacture of dissolved bones. In glue-making the cleaner bones are picked out, and, after the fat extraction, they are broken up and steamed a fresh at a much higher pressure and temperature by which process the collogen takes up water and becomes converted into gelatine, which dissolves. The bone residue flour." Owing to the removal of the car- is ground and sold as "Steamed bone flour". Owing to the removal of the cartilage, this material can be ground finely, and forms a dry friable powder very convenient for use as a manure.

The coarser kinds of bone meal are converted into dissolved bones by being mixed with enough sulphuric acid to convert about half the phosphates into a soluble condition; steamed bone meal is also often treated with acid, but the product is not regarded by the trade as dissolved bones, but should be called soluble bone compound.

CRUSHING BONES WITHOUT MILL.

Bones, in country places, where crushing mills are not available, may be reduced to powder by means of caustic lye (solution made out of ashes), quicklime or freshly calcined wood ashes. A simple plan is to pack the bones layer by layer, with freshly calcined wood ashes, in a barrel, and keep the mixture moistened for some months.

A quicker method is to boil the bones in an iron or copper boiler with strong caustic lye. The proportion of bones and lye to be used is roughly 15 parts by weight of caustic soda or 7 parts by weight of caustic potash dissolved in 15 parts by weight of water. The boiling should be done to 2 or 3 hours. But even without boiling the bones would become disintegrated, being simply kept in the caustic liquor for about a week.

Another method of softening bones is by mixing them in heaps with quicklime and loam. A layer of loam 4 inches deep is first spread, and on this is put a layer of bones 6 inches deep and above this a layer of quicklime 3 inches deep. The layers of loam, bones and quicklime are

repeated until the heap reaches a convenient height, when it is covered all over a thick layer of earth. Holes are then bored in the heap from the top and water poured down them to slake the lime. The mass will become friable, and the whole heap may then be mixed up and spread as manure on land.

Another method of bringing bones into a fine state of division without the help of a mill is to mix them with half or a third of their weight of clay or earth, saturating the mixture with urine, placing it in a pit and covering the pit up with two or three inches of earth. In 2 or 3 weeks the bones get disintegrated and the addition of wine makes them a better general manure. Fermented bones act more readily in the soil, and they are more valuable than bone-meal for light soil.

SUPERPHOSPHATE.

In foreign countries the rapidity of the action of bones in soil is increased by treatment with sulphuric acid, by which tri-calcium phosphate is rendered soluble being converted into mono-calcium phosphate, bones, bone-ash and mineral phosphates of all kinds into superphosphate or superphosphate of lime. The same process may be used for converting mineral phosphates of all kinds into superphosphates. 100 parts of pure tri-calcium phosphate require 91 parts of chamber acid (sulphuric acid) to act.

To manufacture superphosphate the raw steamed bones or mineral phosphates are finely powdered. This powder is placed in a closed vessel called a a mixer, the necessary amount of sulphuric acid being dropped into the vessel gradually from a tank above it. The gases given off pass out through a long tube where the gradually condense and pass out. As the acid is gradually let into powdered mineral, a strong shaft provided with rakes keeps the powder continually agitated. When the proportional quantity of acid has been used up and the mixing completed, the contents of the vessel is allowed to fall into a brick or stoneware chamber, which, when full, is closed. The mass is allowed to remain there until its temperature is reduced, the rise of temperature is reduced, the rise of temperature being due to the mixing of the phosphates with the acid.

The contents of the chamber are afterwards dug out and passed through a disintegrator, which renders the manure into a powdery condition in which state it is sold.

The modern method of manufacture of this valuable substance comprises three principal operations: (1) Grinding the raw materials; (2) rendering the ground raw phosphate solution in sulphuric acid; (3) the drying of the superphosphate.

Raw phosphate should be carefully ground by means of ballmills, runners or flatstone mills; because it is found that the fineness of the phosphate contributes to a great extent to a perfectly successful superphosphate. This the powder should not leave more than 10 per cent. of residue on a 70 mesh sieve, and this residue should not exceed the size of groats; it is only at this cost that all the phosphoric acid is rendered soluble. The ground material is then put into a mixing machine. It consists of an egg shaped cast iron pan 64 inches wide at the top and 48 inches wide at the bottom, fitted with two discharge doors, with lever and counterpoise, which enables the mixing to be run into an enclosed space, called the decomposition chamber sunk in the ground. In the pan a vertical shaft turns, driven by a cog-wheel gearing and carrying blades of a special form arranged in a helicoid manner; these lifts throw down,

and triturate the mass and prevent it at the same time from being deposited and attached to the sides. It suffices to pull the bent levers to open the discharge doors and thus let the liquid fall into the decomposition chamber.

Now to render the ground raw phosphate soluble in sulphuric acid, the material is put into the mixer and the required amount of cold sulphuric acid of density between 50° and 55°Be. The machine is started at once. When proper mixing has been obtained, the mass is thrown down to the decomposition chamber by opening the doors.

Owing to the gas given off, the thick liquid effervesces; at the same time it heats up to 248° to 302°F. Gradually it settles in the den, and after an hour it sets. An addition of dolomite keeps it liquid for some time longer, so that the water evaporated is then much greater.

All the heat given by the reaction ought to be utilised with that end in view, that is, carrying off the water. It is only when this is done that perfect solution is realised, and that a superphosphate that will behave well on subsequent manipulations is obtained.

BASIC SLAG.

It has been found within recent years that the phosphate slag from the basic process of steel-making possesses considerable value as a fertiliser. The content of phosphoric acid varies from 10 to 25 per cent. and, according to some, the phosphoric acid exists as calcium phosphate. The slag is, however, of little value as a manure unless it is very finely ground—e.g. 80 per cent of it should pass a sieve having 100 meshes per linear inch. The attainment of this condition constitutes the preparation of the slag for the market, and is expensive on account of hardness of the material. Grinding is commonly performed by a ball mill. Rotation of the drum breaks up the slag by the rolling and percussive action of the balls, and the comminuted material is systematically separated by sieves in the sides of the drum. The sieves which effect the final separation are protected from direct contact with the balls by perforated iron plates.

GUANOS.

Guano is derived from the Peruvian word huana or dung and it consists of the consolidated excrementation matters of fowls, pigeons, bats and sea-fowl. Guanos are only found to any great extent in those localities where rainfall is practically nil. Besides Peru, guanos are obtained from many other countries: namely Chile, Bolivia, Patagonia, Texas, Cuba, Australia and others.

Guano is a very complex substance, but its chief value for agricultural purposes lies in the fact that it contains a considerable quantity of phosphate of lime and nitrogenous substance. The chief ingredients of guano are calcium phosphate calcium carbonate, guaniul, alkaline salts, etc. As such guano is the most important of all the artificial fertilisers of the soil. It has a special value in protecting sugarcane cutting from being attacked by white ants and is also regarded as one of the best manures for wheat, 2 to 3 cwt. an acre being sufficient. It acts rapidly and is expended almost entirely on the crop to which it applied.

The guanos of commerce may be divided into those whose value is chiefly due to the nitrogen and those whose is chiefly due to the phosphorus.

POTASH MANURES.

Potash is more widely distributed in soils in the form of felspar and mica than are nitrogen and phosphoric acid. The pink coloured orthoclose felspar is richest

in potash. In felspars, potash it contained in a more soluble form than in mica, and its solubility is enhanced by admixture of lime.

When the salts of potash are added to the soil, the base is absorbed and not washed out, freeing the acid radicle which attacks the lime or other basis in the soil. The potash is retained, and calcium sulphate, calcium nitrate and calcium chloride appear in the drainage water.

From 4-6 cwts. per acre are suitable quantities of a potash fertiliser to apply if farmyard manure has been given. The latter is rich in potash, and reduces the need for potash fertilisers.

For potatoes, the sulphate to be preferred to the chloride, and from 1-2 cwts. per acre are suitable quantities if no farmyard manure has been applied. For cereals on light land, after a straw crop, and land poor in potash 57 lbs. potassium chloride or sulphate or 100 lbs. 30 per cent. potash salts, or 140 lbs. 20 per cent. potash salts, or 2 cwts. kainit should be applied as part of the general dressing of fertilisers.

Leguminous, root, and leaf crops require from 100-200 lbs. of potassium chloride or sulphate, or proportionally greater amounts of potash salts or kainit.

Grass land does well with 60-75 lbs. of potassium chloride, or proportionally more of potash salts or kainit.

For the cultivation of fruit and tomatoes, it is important to have potash, and the green patch on tomatoes is probably due to a deficiency of potash. The leaf scorch of fruit trees is stated to result from the same case.

Potash especially improves the size and weight of roots, seeds, and fruits, and is essential in the cultivation of sugar producing plants, especially potatoes, tomatoes, and sugar beet. It is importan in barley cultivation.

POTASH SALTS.

Originally all potash salts for the production of fertilisers came strassfur deposits in Germany, but more recently natural deposits in Alsace-Spain and America have been investigated. The natural potash deposits contain sylvinite kainit, carnallite, potassium chloride, and schoenite. The crude salts of commerce are obtained from these deposits, and fertilisers containing 20, 30 or 40 per cent potash are made or blended; but generally purified salts are first prepared in the following manner:—

POTASSIUM NITRATE.

Potassium nitrate is the best nitrogenous manure to use. Moreover in addition to nitrogen it contains potassium, a valuable plant-food, this substance can be used for the double purposes. Another special advantage is that it is manufactured largely in Bihar and to a certain extent in several districts of the United Provinces, the Punjab, Bombay, Madras and Burma. The climate best suited for the production of nitre is where dry weather follows the rains and thus by evaporation allows the salt to effloresce on the surface.

The manufacture in Bihar is in the hands of Nuniahs. They make piles of loose earth after the rains are over and build mud walls round them, that the previous stuff may not be washed away. This earth is obtained by scraping off an inch or two of the bed chosen and made into conical heaps 2 to 4 feet high, when a large number of these heaps have been collected, the impure saltpetre earth is lixiviated in earthenware dishes or wooden boxes or in pits dug in the ground and made tight by a clay puddle. The liquor is concentrated in iron pots or sometimes only by solar heat and a crop of very crude saltpetre is obtained.

POTASSIUM CHLORIDE.

Potassium sulphate fertilisers are hardest to produce. It is made from kainit, or by acting upon potassium chloride with sulphuric acid.

A saturated solution of kainit is allowed to crystallise, when potassium sulphate comes out of solution, or a mixture of kainit and sylvinite is treated with a hot solution of kainit and cooled to produce the same salt. This is sometimes used directly as a fertiliser. To produce potassium sulphate from the salt, a hot saturated solution of it is run on to dry powdered potassiuum chloride, when potassium sulphate is produced in crystals and separated at a low temperature in a centrifuge.

Another method is as follows:—

When fluorspar is added to the clays and shales used in the manufacture of cement, the potash is volatilised in the cement kiln as potassium fluoride. The fuel produces sulphuric acid, which reacts with water dissolves out most of the potassium sulphate, and it is recovered as such.

POTASH FROM FELSPAR.

The felspar is finely crushed, beaten up with water, then run into a wooden vat placed in a large receiver of any material. The outside receiver is then filled; the inside receiver is then connected with the positive pole and the outside receiver with the negative pole of an electric current. This partially liberates the potash, the soda and other soluble bases freeing them from the compounds which they form with silica. The soluble bases traverse the wooden wall of the interior vessel and pass into the water of the exterior vessel which they render alkaline. However, the felspar soon ceases to decompose. To render the decomposition more rapid and more permanent the mass in the interior vessel is continually st or hydrofluoric acid added.

WOOD ASHES.

The commonest potash manur ashes of all kinds. The ashes of h trimmings contain upto 10 per cent. potash. The ashes of young wood a potash content as high as 25 per potash. Sunflower ash obtained burnt leaves, stalks, and heads cont 20.9 per cent. of potash; while m ashes may produce 36.3 per cent. potash. Water hyacinth also cont potash salts and its ashes may there be utilised in fertilising the soil.

The potash in these ashes is in a h ly available form mainly as carbor and should not be allowed to remain the open, for rain will wash out mos the potash. The ash also tends to ab moisture from the air, and should ei be used immediately or mixed with su phosphate.

POTASH CARBONATE.

Impure or crude pearl ash is ma prepared by lixivating wood ashes, evaporating the solution to dryness. mass is then transferred into iron p and kept in a state of fusion for sev hours until it becomes quiscent, when heat is withdrawn, and the whole is to cool. It is next broken up and pac in air-tight barrels, and in this state, r ed with some potassium chloride some sulphate, it constitutes the potas or potash of commerce.

In order to obtain much purer proc the raw potash, 10 parts, is dissolved cold water, 6 parts, and the solu allowed to remain for 24 hours in a place; it is then filtered, and somew concentrated by evaporation, crystall tion being prevented by continually st ing the mass until the whole is ne cold; it is next decanted into a strai

and the mother liquor allowed to drip off; the residuum is evaporated to dryness at a gentle heat, and redissolved in an equal quantity of cold distilled water: the new solution, after filtration, is again evaporated to dryness. The product is quite free from potassium sulphate, and is nearly free from potassium chloride and any silicates that may be present.

POTASH FROM SPENT MOLASSES LIQUOR.

The spent liquor is burnt after it has been concentrated, to produce a charcoal. The waste charcoal contains 8 per cent. and over of potash, generally as carbonate, and is suitable for use as a fertiliser.

BANANA REFUSE.

The stem of plantain plant contain a considerable amount of potash, and the ash of them can provide a suitable source of this fertiliser.

LIME.

No method of improving the soil other than fertilising or cultivating it, is so important as liming or chalking. Its presence tends to govern the efficiency of true fertilisers, in addition to being a plant food in itself.

One of the chief functions of lime in the soil is to overcome sourness. A soil deficient in lime will become sour, and the decay of organic matter in complete due to the formation of peaty material, acid in character.

Lime also improve to a large extent the condition of the soil, especially of clay soils, which show the greatest benefit in little by the application of lime, in that it renders them more open and porous, and less subject to shrinkage and caking, and more easily worked.

The amount of lime in clay soils should be at least 0.5 per cent. Lime has marked effect upon the mineral constituents of the soil, in that it breaks down the insoluble potash salts, replacing the potash, and having this substance available as plant food. To some extent it also liberates phosphoric acid from the soil.

LIME AND FERTILISING.

The continued use of ammonium sulphate, without lime, over many years, results in the soil becoming so acid as practically to inhibit growth. Heavy application of farmyard manure tends to correct the unfavourable condition brought about by the continued use of this fertiliser without lime.

The presence of lime in the soil allows a more efficient utilisation of soil nitrogen, and of that contained in the fertiliser. The application of super-phosphate cannot replace lime in the soil, as it is the basic action of the latter which is its most valuable property.

Although lime is so necessary, and generally increases crop production, it must be remembered that it is not a substitute for fertilisers, and it should not be mixed with fertilisers of any kind. The best effects of lime are realised after a year or two.

Too heavy or too frequent dressings of lime are harmful, as they exhaust the stores of nitrogenous materials contained in the soil. Lime is converted into carbonate, and then in bicarbonate in the soil, and is then carried away in solution.

AMOUNTS OF LIME TO USE.

For normal soils, the amounts of lime required are stated to be from ½ to 1 ton of quicklime or 1-2 tons of chalk per acre in 4 or 5 years, but for acid or sour soils more may be required, and more frequent applications. More is also required for heavy or wet lands, but less for light soil.

If the soil is known to be sour, the lime should be applied as long a time as possible before the next crop.

METHOD OF APPLICATION.

Lime is best applied to ploughed land and worked into the soil as the seed bed is prepared. It should be thoroughly mixed with the surface three to five inches of soil. Top-dressing of lime is seldom recommended except on permanent meadows and pastures. The time of year at which lime is applied is immaterial the system of farming, the type of rotation, and such considerations being the deciding factors. The soil should not be too moist when the application is made, as this tends to ball badly and thus thorough distribution is prevented.

CROPS RESPONSE TO LIMING.

There are a number of reasons why plants may be benefitted by lime, these reasons are numerous and complex enough to account for the differences in response among common crops. The possible influences of lime on plants may be listed as follows: (1) direct nutritive action; (2) synegistic relationships ether in the soil solution or in the cell-wall; (3) removal or neutralisation of toxins of either an organic or inorganic nature; (4) effect on plant diseases; (5) liberation of mineral nutrients; and (6) encouragement of the biological preparation of nutrient materials.

MANURE FROM ANIMAL WASTE.

The utilisation of waste of animal origin is of the same importance as of human excreta. Like the latter, the products have come from the soil and been paid for in the manure. Unfortunately, these wastes are not collected with sufficient care, in spite of the great facility with which they can be utilised. Vast quantities of blood are annually lost in the slaughter house of both large and small towns. Their conversion into chemical manure is their best disinfection.

DRIED BLOOD.

The dried blood from slaughter-houses may be used as fertiliser. For this purpose the blood is coagulated by steam in an open pan, adding to it 3 per cent. of ferric sulphate solution marking 51°Be. The coagulated blood is then land to drain in perforated cases where it remains for a month. The coagulated and drained product is then dried on hot cast-iron plates in a shelf-oven traversed by hot gases. Finally the mass is powdered and used as manure.

Recently a simple process has been used to dry blood and to reduce it to a fine powder. This process consists in adding 1½ to 3 per cent. of quicklime, which converts it into a solid cake which may be dried in the air without putrifying, and finally gives a fine and inodorous powder. This process has the advantage of being applied everywhere without any plant; moreover, it preserves 0.4% of nitrogen, which otherwise would be lost with the coagulation water.

ANIMAL REFUSE.

Horn turnings and shavings contain 13 to 15 per cent. of nitrogen. So these may be used as manure. But they are generally mixed with wood shavings and other sweepings of the workshops, reducing its manurial value. Hoofs are, however, richer in nitrogen than ground horn. Hair wool, wool rags, old felt, and feathers have the same value as horn. But great care must be taken in buying, because it is difficult to determine the impurities of all sorts which may be mixed therein. In the pure state they contain 1[illegible] to 13 per cent. of nitrogen. Wool dust from the combing and spinning of wool is not of a nature to inspire much confidence. It rarely contains 6 per cent. of nitrogen. To serve as manure all these materials and particularly horn must be reduced to a fine powder. But even when apparently dry they are as tenacious that it is impossible to grind them. To grind horn and all these into fine powder, they

are first roasted by spreading them over a cast-iron plate or in a shallow pan, which is heated without interruption so as to avoid overheating and loss of nitrogen. The matter assumes a dark colour, and when it is cool it is brittle and easy to crush.

LEATHER WASTE.

Tanners' curriers' waste for glue making may be used as manure. They contain 7 to 11 per cent. of nitrogen. To convert these into manure these may be treated in the same way as horn, roasting or steaming in a closed vessel, and grinding. The roasting of tanned leather renders it friable and than crush into powder.

COMPOUND MANURES.

Compound or mixed manures are sometimes required for certain crops. In the preparation of these fertilisers the most important ingredients required by any particular crop are chief constituents of such manures. The following suggestions will be found effective. It is however, not intended that they should be slavishly follewed, for useful substitutions may be made in the formulas given if the nature of the various fertilisers is understood and is obtained of the principles of manuring explained above.

In place of nitrate of soda, a similar quantity of sulphate of ammonia may be used. Instead of of superphosphate, the following may be advantageously employed; phosphate guano, or mixtures of basic slag and superphosphate, or bone meal and superphosphate; or basic slag may be applied above on land deficient in lime.

Five pounds of kainit may also take the place of one pound of sulphate of potash.

TEXTURE OF SOILS INFLUENCED BY FERTILIZERS.

There appears to be a large number of substances, and among them many of the chemical fertilizers, which have an appreciable influence in altering the texture of the soil, making it more or less open and friable. Among them which have the power of flocculating colloidal clay, lime has been most generally recognised, and it appears that this may be applied to the soil either as the oxide, hydrate or carbonate, with the same ultimate effect, though perhaps with varying rates of action.

Either directly or indirectly, fertilisers exert an influence upon the relation of water to the soil, as, indeed, has been implied in what has been said regarding their power to make the texture of the soil finer or coarser.

When fertilisers are applied, the soil may react upon them either chemically or physically, and in such a manner as often to wholly prevent or greatly diminish their loss in drainage waters at times when percolation is taking place. Therefore, it is better to spread the manure over a large area in the right amount than to concentrate it in heavy dressings in small areas.

JUDICIOUS APPLICATIONS OF MANURES.

In order to make the best use of commercial fertilizers, both the soils and the crop must be carefully considered. All soils do not alike respond to commercial fertilizers, and farm crops possess different powers of assimilating food; turnips, for example, have very restricted power of phosphate assimilation, hence they may not need help in obtaining its nitrogen, require phosphate manures and wheat A wheat crop will starve for want of nitrogen, while an adjoining corn will scarcely feel its need. Wheat has strong power of assimilating potash, while clover has less. Hence in the use of fertilisers the ability of the plant to obtain its food

must be considered. A light application of either a special preparation or a complete fertiliser at the time of seeding is often advantageous, as it encourages plant growth by supplying food when it is most needed. There should some at this time in a highly available condition the use of the young plants, after the food stored up in the seed has been exhausted, and before they are strong enough to make available their food.

Commercial fertilizers may assist in promoting desirable bacterial changes in soils resulting in the elaboration of plant food. Before they are used, however, careful field should be made.

VEGETABLES AND MANURES.

Manure is of value as a source of humus, as a carrier of nitrogen, phosphorous and potash and as a promoter of useful organisers. Vegetable growers would not be justified in buying manure for its nutrient value under most conditions. The elements, nitrogen, phosphorous and potash can be bought more cheaply in chemical fertilisers than in manure when the cost of handling and applying are taken into consideration. Manure, however, is the most valuable source of humus available and some form of organic matter is necessary to keep the soil in good condition. Manure improves clay soils by making them looser and more friable, improving drainage and aeration. It improves sandy soils by filling spaces between the soil particles with humus and therefore makes them more retentive of moisture. By heavy applications of manure to sandy soils vegetable growers are able to produce good crops which would be impossible without manure or some other source of humus.

FRESH MANURE VS. ROTTED MANURE.

Among the advantages of using manure while it is fresh are:—(1) There is little loss of valuable materials through bleaching and decomposition, (2) some insoluble materials in the soil are made soluble by the decomposing manure coming into contact with the soil particles, (3) desirable organisms are supplied in the fresh manure, (4) the texture of heavy soils is improved, and (5) the growth of foliage is favoured and therefore the yield of crops grown for their stems and leaves is increased. Among the disadvantages of fresh manure might be mentioned: (1) unfavourable effects on the soil when applied in large quantities; (2) burning effects on plants, due to rapid decomposition of urine in manure, especially in open porous soils; (3) carries weed seeds and germs of plant diseases.

Decomposed manure contains phosphorous and potassium in more available forms and in large percentage than in fresh manure. The large percentages are due to the fact that the organic matter has been reduced in amount by decomposition. The nitrogen in decomposed manure is not as readily available as that in the urine of fresh manure. Some of the advantages of decomposed manure are: (1) More even action and more evenly balanced combination of nitrogen, phosphorous and potash, (2) less likelihood to cause burning, (2) smaller bulk to handle for same amount of fertilising materials, (4) weed seeds largely destroyed during decomposition and (5) less interference with soil preparation and cultivation.

SYSTEM OF MANURING CROPS.

The following hints on manures appropriate to each of the staple crops is intended to supply the farmer, not with a series of recipes or patent mixtures that are universally applicable, but with principles appropriate to his own farm.

RICE.

Rice land is seldom manured; but manuring with oil-cakes, at 3 maunds per acre, would generally give a better yield, and perhaps play for the outlay by the increased outturn. Tank earth may also be applied to the soil but it may be used once in 3 or 4 years, 30 to 100 cart-loads per acre may be used at a time. In place of oil-cake 80 lbs. of bone-dust and 80 lbs. of saltpetre per acre would be used. The bone-dust should be applied at the time of cultivation, and the saltpetre a fortnight after transplanting, mixing up thoroughly with the earth along the lines of transplanting.

WHEAT.

Potassium nitrate or sodium nitrate 1½ maunds per acre (top dressed) is the best manure for wheat. If the land is known to be poor, 1½ maunds of bone meal should be used beforehand at the time of ploughing, though no immediate benefit will be derived from such application. 5 maunds of oil-cake may be used instead. But better result will be obtained from the sulphate or the following mixture applied at time of sowing.

Sulphate of ammonia	¾	Cwt.
Super phosphate	1½	,,
Bone meal	½	,,
Potassium chloride	½	,,

The above mixture is suitable for one acre. Of course when wheat and other cereals are grown continuously on the same land, it is necessary to employ a more complete fertiliser 2 Cwts. per acre of nitrate of soda or sulphate of ammonia will be required as a spring top-dressing, and 3 Cwts. of superphosphate or 2 Cwts. of basic slag, according to the amount of calcium carbonate in the soil should be sown before the seed. Potash would only be necessary on the lighter soils, on which wheat is not likely to be grown continuously, but in such a case 3 Cwts. or so per acre of kainit would be desirable. Fertilisers for wheat may be crude salts, like nitrate of soda or superphosphate; the establishment of a plant is little affected by the amount of humus in the soil and the extra price of organic manures like the guanos will rarely be rapid by an increased yield.

BARLEY.

Barley grows but in lighter soil which is first manured with farmyard manure, 30 cart-loads per acre is sufficient. After roots, the barely crops may be manured by the following:—

Superphosphate	1½	Cwt.
Steamed bone flour	½	,,
Sulphate of potash	½	,,

Mix. This is sufficient for one acre

For barley on poorer land of after another corn crops, the same mixture might be applied with the addition of ¾ to 1 Cwt. sulphate of ammonia. On lighter soils the amount of potash may be increased.

OATS.

Oats can be grown on all soils but the best results of course being obtained from rich friable loam, somewhat lighter than typical wheat land. It is quite safe to give an application of the following:—

Sulphate of ammonia	¾	Cwt.
Bone meal	1	,,
Superphosphate	1	,,
Kainit	2	,,

All per acre.

Dissolved bones and potassium chloride (½ Cwt.) may be substituted for superphosphate and kainit.

MAIZE.

Maize is an exhausting crop and it requires heavy manuring. The use of saltpetre would be of benefit to maze plant. If the land is known to be poor, cow dung or some other general manure

applied in the cold weather or before sowing would give better results.

LEGUMINOUS CROPS.

The leguminous plants are able to obtain nitrogen from the atmosphere by the agency of the bacteria in their nodules and can in this way satisfy their requirements for nitrogen. To obtain the biggest crops rich soil and certain nitrogenous manures are necessary, but to secure the greatest profit out of a leguminous crop. It should be left as far as possible to derive its nitrogen from the atmosphere. All leguminous plants are particularly sensitive to any trace of acidity in the soil, so alkaline fertilisers like basic slag or nitrate of soda should be selected. Lime is also desirable both for its basic properties and as a liberator of insoluble potash in the soil, because all leguminous crops are specially dependent upon an abundant supply of potash.

ROOT CROPS.

A suitable mixture for swedes when no farmyard manure is available, will consist of 4 cwts. of superphosphate (or its equivalent in basic slag or steamed bone flour as before), 2 cwts. of fish or meat guano, and ½ cwt. of a mixture of nitrate of soda, sulphate of ammonia as a top dressing when the plants are singled. If the land is in really good heart, the fish guano can be omitted or reduced. It will be seen that various compounds of nitrogen are used in order to ensure a steady and continuous supply of nitrate as long as the plant is growing.

Of the other crops allied to swedes, white turnips require much the same treatment, except that the fish guano may be omitted because they possess a shorter period of growth, while the potash is more necessary. Kohl rabi may have just the same treatment as swedes, with the addition of more nitrogen. Cabbages in particular will respond to enormous quantities of nitrogen. In addition to the farmyard manure or fish guano recommended for swedes, upto 3 cwt. per acre of the mixture of nitrate of soda and sulphate of ammonia may be used in two or three top dressings.

POTATO.

Potatoes are benefitted by high manuring and one of the following is recommended:—

(1)	Bone Superphosphate	6	mds.
	Castor Cake	18	„
(2)	Rotton cow dung	400	„
	Ashes or lime	15	„
	Castor Cake	15	„
(3)	Sulphate of ammonia	2	Cwt.
	Superphosphate	3	„
	Dissolved bones	3	„
	Steamed bone flour	½	„
	Sulphate of potash	2	„

CABBAGES.

These require considerable quantities of nitrogen and phosphates. A general manure for this purpose as follows:—

	per acre.	
Farmyard manure	15—20	tons
Sulphate of ammonia	1	cwt.
Superphosphate	3	„
Steamed bone flour	½	„
Kainit	3—4	„

Mix. Two top dressings (each 1 cwt. per acre) of nitrate of potash or nitrate of soda should be given, one when the plants stand up after planting and the other when they are well established.

CAULIFLOWERS.

Cauliflowers are specially benefitted by mustard cake and lime or ashes at 10 maunds and 5 maunds respectively per acre. The following mixture is recommended:—

	per acre.	
Cow-dung	600	mds.
Nitrate of soda	1	Cwt.
Superphosphate	1	„
Sulphate of potash	½	„

PULSES.

Next to cereals, pulses occupy the most important place as food grains. The

general recuperative effect of pulse-crops on soils should be remembered. Lime and ashes are the best manure for pulse crops, and cowdung and other organic manures, the worst.

PEAS AND BEANS.

These kegyminous plants are able to obtain nitrogen they need from the air. They should, however, be amply supplied however, be amply supplied with potash and phosphates, a good dressing beings:—

	per acre.
Superphosphate	2 Cwt.
Sulphate of potash	½ ,,

ONIONS.

Onions never succeed without an ample supply of potash. This crop should therefore have farmyard, manure, or special potash fertilisers in adequate quantity.

Farmyard manure	5 tons.
Nitrate of soda or potash	½ Cwt.
Super-phosphate	2½ ,,
Sulphate of potash	½ ,,

TOMATOES.

Tomatoes need large supplies of potash and phosphates, to induce stocky growth and abundance of flowers and fruit. Nitrogenous manures should be withhold until the following stage, for they stimulate the production of rank succulent stems and leaves which are specially liable to attacks of fungus pests. After the fruit is set the application of small doses of nitrate of soda or potash, or sulphate of ammonia greatly assets the swelling of the crop. The following mixtures worked into the soil will be found beneficial for tomatoes:—

		per acre.
(1)	Superphosphate	3½ Cwt.
	Sulphate of potash	¼ ,,
(2)	Basic slag	4 ,,
	Sulphate of potash	¼ ,,

Nitrate of soda or saltpetre or sulphate of ammonia, at the rate of ½ Cwt. per acre may be given with advantage as soon as the fruit is set.

TROPICAL CROPS.

It is very difficult to lay down any general rules for the manuring of tropical and subtropical crops. Certain general principles may, however, be indicated to be taken into account. It is always the crops of short duration on the land—tobacco, cotton and to a less extent sugarcane—which most require manu[illegible]ater really perennial crops like tea and [illegible]ay be require much less manure and that [illegible] more slowly acting kind. It is only the short period crops which will respond properly to active sources of nitrogen like nitrate of soda or sulphate of ammonia.

SUGARCANE.

Sugarcane responds well to a heavy outlay on manures. The following mixtures are recommended:—

(1)	Bone meal	10 maunds	per acre applied before sowing.
	Castor cake	30 maunds	per acre applied after sowing, in two doses.
(2)	Cowdung	600 maunds	per acre ploughed in before trenching.
	Bone meal	10 maunds	per acre before sowing.
(3)	Powdered apetite	6 maunds	per acre applied before sowing.
	Castor cake	20 maunds	per acre applied after sowing, in two doses.
	Saltpetre	2 maunds	per acre applied in two doses after the plants are a foot high.
(4)	Fish manure	30 maunds	per acre after sowing.

(5)	Rape Cake	50	maunds per acre before and after sowing ;
(6)	Superphosphate of lime	5	maunds per acre.
	Sulphate of ammonia	1½	" " "
	Sulphate of potash	1½	" " "

A handful of this mixture is put under each plant when 1 foot high.

Human excreta are considered a most suitable manure for sugarcane. Even cowdung should be rotted for 4 or 5 months, dried and powdered. In a powder state dung has more invigorating effect than in the plastic state. Some use only sulphate of ammonia for sugarcane grown after a green crops (such as cow-pea) is ploughed in.

Tea.

The manure especially applicable to plants like tea of which the leaves are used, should be particularly rich in potash and nitrogen, also lime. A practice of growing mati-kalai (Phaseolus mungo) or Dhanicha (Sesbania aculeata) between tea plants has sprung up of late years, and its effect said to be excellent on the tea bushes. Castor cake is an excellent mature. Rope or mustard cake may also be applied for renovating the soil. But also applying basic slag at the rate of about 2 cwts. per acre the residues thus utilised are balanced by the phosphate. When manures are necessary it is best to employ slow acting substance like bone meal and castor pomace.

Tobacco.

Before planting out the tobacco 200 to 300 lbs. of an organic nitrogen compound —cotton seed meal of castor pomace— 200 lbs. of superphosphate and 100 lbs. of sulphate of potash should be applied, followed by 100 lbs. of nitrate of soda when the plant is growing; potash appears to be very essential, and may be given as nitrate, carbonate, or sulphate.

Cotton.

Cotton responds freely to fertilisers, and there is evidence that the fertiliser should be a mixed one but mainly phosphatic. About 4 cwts. per acre superphosphate and 2 cwts. per acre of cotton seed meal or some equivalent organic source of nitrogen, should be ploughed in before sowing and this may be followed up by a ½ cwt. per acre of a more active nitrogenous fertiliser like sulphate of ammonia or nitrate of soda when the crop has begun to grow.

Jute.

Where there is silt deposit no manuring is required. Elsewhere cowdung at the rate of 150 maunds per acre may be applied where necessary. All fibre crops are appreciably benefited by cowdung manure, except those belonging to the leguminous order.

MANURING GARDEN CROPS.

For such crops of the garden as are grown on the farm, the manurial treatments already suggested for these may be followed. In the garden, however, are grown many crops which are not, generally produced on the farm. Various mixtures of artificial fertilisers have been recommended for different classes of garden crops. In general, however, it is more practical to use one or two mixings as the basis of the artificial manuring.

Lime is just as important in the garden as on the farm, and gardens deficient in this respect are often very disheartening on account of the prevalence of club root, and other troubles which flourish under sour soil conditions. Applications of ground lime or of limestone should be made every fourth year, using about one pound per square yard of ground limestone, or rather more than half this amount of ground lime.

Maintenance of the humus or organic matter of the garden is essential to effi-

ciency. Farmyard or stable manure, when available, should be used for this purpose and it should always form part of the manurial treatment of such crops regarded as greedy fudess and requiring moist soil conditions.

When dung is not available, organic material may be obtained usefully by making compost heaps of vegetable refuse, which when rotted, may be dug into the soil. It is sometimes possible to practise green-manuring by growing crops of vetches or clover and digging these in.

The following mixture of artificials may be recommended for general purposes in the garden.

Sulphate of ammonia	14 lbs.
Bone meal	14 „
Steamed bone flour	14 „
Superphosphate	**28 „**
Sulphate of potash	14 „

For crops like turnips, cabbages, and the like, kainit may be used instead of sulphate of potash, and such crops also benefit by to dressings with nitrate of potash or soda after thinning, or when well established after transplanting.

On light soils deficient in organic matter, for vims, for fruit trees and bushes, and for flowers generally, the following mixture has been recommended.

Hoof and horn meal	14 lbs.
Steamed horn flour	14 „
Bone meal	14 „
Sulphate of potash	9½ „

Such mixtures should be applied at the rate of about 3 oz. per square yard.

MANURING FRUIT TREES.

This is a subject of very great importance in relation to the successful cultivation of hardly fruits. Three main elements of plant food are required to produce successful growth and development of fruit. These are phosphates, nitrogen and potash. Phosphetes assist in the development of flowers and the seeds; potash in the formation of fruits; and nitrogen in the leaf, cell, and tissue formation; but all three combine in the formation of the tree as a whole.

As the trees grow and perfect their fruits, they take annually out of the soil a good deal of phosphates, potash, and nitrogen. So it is necessary to add these in the shape of manures to maintain the food of the plants.

Stable or farmyard manures serve the two-fold purpose of supplying the soil with humus for the encouragement of bacteria and maintaining it in a friable condition; also providing a proportion of the three main elements of food. It is not desirable that they should be mixed too freely with the soil before planting but they can be used as a mulch to established trees.

Among the artificial manures the following may be advantageously employed. These that supply nitrogen are nitrate of ammonia, nitrate of soda, nitrate of lime, nitrate of potash, sulphate of ammonia, soot and dried blood. These that supply phosphates and nitrogen are guanos, fish guano, bones, and dissolved bones; phosphates only—bone ash, bone blacks, mineral phosphate, superphosphate of lime, bone meal and basic slag. These, again, which supply potash are sulphate of potash, chloride of potash, and carbonate of potash, kainit and wood ashes.

Nitrogenous manures, which are soluble, may be applied ½ to 1 oz. of the salt dissolved in 1 gallon of water per square yard in a week.

Phosphatic manures to be used by forking at the rate of 1 oz. per square yard when the fruit begins to colour.

Potash may be employed at the rate of 4 oz. per square yard. These should be forked into the soil in spring.

Lime encourage the development of the nitrifying bacteria and is of immense

importance to all stone fruits and without its presence in the soil the trees will neither grow nor fruit satisfactory. The best form of lime to apply is ground quicklime and this should be forked in every third year at the rate of 4 oz. per square yard.

TIME TO APPLY.

The proper time to apply manure depends on the kind and age of the manure, the stage of its decomposition, the corps to be grown, and the rotations to be followed. When the cow manure is to be applied it should be ploughed under as far in advance of planting as convenience.

AMOUNT AND METHOD.

The rate of application depends upon the supply of manure, the kinds of crops to be grown and the character and richness of the soil.

CARE OF MANURE.

The liability of manure to a rapid loss of its constituents makes proper care and handling of the material an extremely important consideration. The richer the original manure is in nitrogen, phosphorus and potassium, the greater is the liability to loss. This tendency is due to the more rapid fermentation of a substance rich in nitrogenous material and to the greater possibility of loss from leaching in substances containing large amounts of soluble mineral salts.

For crop purposes the elements of the soil may be divided into three classes.

STORING OF MANURE.

The two fundamental requirements for the proper care of manure are to prevent leaching and to minimise the loss of nitrogen from fermentation. These two ends are best obtained by storing the manure in covered sheeds with tight bottoms and keeping it carefully spread and moistened. Where covered sheds with tight bottoms can be provided for live stock, the loss in manure can be reduced to a minimum. Leaching is prevented by the roof and tight floor; the trampling of the animals keeps the manure compact and the urine furnishes moisture which reduces fermentation.

VALUATION OF MANURES.

In considering the value of fertilisers, it should be remembered, that apart from their plant food value, some of them have a very real effect upon soil condition and improvement, and in the purchase of materials this point should be borne in mind. Farmyard manure especially and then rope coke, dried blood, guano, and soot, have all an effect upon the soil and improve its physical condition.

Of primary importance, however, is their actual food value, and this is the fundamental basis of their valuation. The purely artificial fertilisers are valued according to the amounts of these constituents, and this is the first thing which determines the worth of the material.

The three plant foods considered are nitrogen, phosphate, and potash, and the various fertilisers offered are compared as to the amounts of these constituents they contain.

The unit value of a fertiliser is the cost of 1 per cent. per ton, and is obtained by dividing the price per ton by the percentage of nitrogen, soluble phosphate, insoluble phosphate, or potash, as the case may be.

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Pharmaceutical Recipes

SUBY-ALBRIGHT SOLUTION.

Citric Acid, Anhydrous	32.3	grams.
Magnesium oxide, anhydrous	3.8	„
Sodium carbonate, anhydrous	4.4	„
Distilled water, to make	1000	„

Mix.

Suby-albright solution has a pH of 4. It is used for irritation in the treatment of persistently alkaline urinary tract infections which have a tendency to form incrustations and develop phosphate stones.

—PHARMACY INTERNATIONAL.

WASHABLE OINTMENT BASE.

Cetyl alcohol	9.2	grams.
Stearyl alcohol	9.2	„
Sodium lauryl sulphate	1.5	„
White petrolatum	30.3	c.c.
Propylene glycol	10.0	„
Distilled water, to make	100.0	grams.

Washable ointment base is an oil in water emulsion, thus, it can be easily removed from the skin with water. It is used as a vehicle for medicinal agents.

BABY OIL.

Olive oil	15	c.c.
Oxy Quinolene base	0.12	grams.
Rosemary oil	0.06	c.c.
Light liquid petrolatum a sufficient quantity to make	120	„

Dissolve the oxyquinolene base in a mixture of the olive oil and liquid petrolatum with the aid of heat on a water bath. When cool add the rosemary oil. This prescription contains 12½% of olive oil in light liquid petrolatum, and oil of rosemary to perfume. It is made antiseptic by the addition of oxyquinolene base.

—PHARMACY INTERNATIONAL.

ULCER OINTMENT.

Zinc oxide	175	gr.
Boric acid, finely sifted	175	„
White soft paraffin	5½	oz.
Hard Paraffin	2	„

Melt the hard paraffin and mix the soft paraffin. Then remove from the source of heat. Triturate the boric acid and zinc oxide until smooth and put in pots.

SODA MINT TABLETS.

Sodium bicarbonate	25.0	grms.
Oil of peppermint	0.3	c.c
Light liquid petroleum	1.0	„
Starch, in fine powder	4.0	grms.

Mix the oil of peppermint and liquid petroleum with the starch, add the sodium bicarbonate, and mix thoroughly by gentle trituration.

Compress in a table machine, using 8 m.m. die and punch to make 100 tablets.

RINGWORM OINTMENT.

Vaseline	8	oz.
Hard paraffin	1½	„
Chrysophanic acid	½	„
Ichthyol	1	dr.
Oil of cinnamon	10	drops.

Melt the vaseline and paraffin over a water bath and when liquid add the remaining ingredients and stir till cold.

MENTHOL TOOTHACHE DROPS.

Menthol	8	parts.
Chloroform	8	„
Alcohol	84	„

Mix the ingredients as intimately as possible. In case of toothache resulting from caries, a little cotton wool soaked in the preparation inserted in the hollow of the tooth.

CUTICLE REMOVER.

Sodium hydroxide	½	oz.
Glycerine	2½	fl.oz
Rose Water	10	„

Dissolve the sodium hydroxide in a solution of water and glycerine, filter and keep the solution in rubber stoppered bottles.

CREAM FOR BURNS.

Sulphanilamide	3	parts.
Glycerine	10	„
Groundnut oil	25	„
Lanette wax or beeswax	10	„
Water	52	„

Mix the first two and last three ingredients separately then mix together.

Recipes for Small Manufacturers

PUTTY.

Whiting	80	oz.
Raw linseed oil	16	oz.

Rub together until smooth. Keep in closed container.

GLASSINE PAPER.

Coat paper with or dipped in the following solution and dry by hanging.

Gum Copal	10	oz.
Alcohol	30	fl. oz.
Castor oil	1	fl. oz.

Dissolve by letting stand overnight in a covered jar and stirring the next day.

INEXHAUSTIBLE SMELLING SALTS.

Aqueous ammonia	1	quart.
Bergamot oil	24	gr.
Clove oil	24	„
Lavender oil	45	„
Mace oil	24	„
Rosemary oil	45	„

Mix all together. Now fill the liquid into an ornamental glass bottle filled with absorbent material such as white glass beads, powdered glass, white pumice stones, potassium sulphate crystals, etc. Fragments of asbestos or sponge may be used. Best vessel is a porcelain dish to allow excess of liquid to drain out, and close with plug or loose cotton wool.

SACHET POWDER OR DRY PERFUME.

Orris root	1	lb.
Sandalwood	1	„
Cassia	½	„
Cloves	½	„
Rose leaves	½	„
Musk	75	gr.

II.

Orris root	3	oz.
Bergamot oil	60	drops.
Essence bouquet	½	oz.
Starch, powdered	8	„
Precipitated chalk	8	„

Mix the first three ingredients together then incorporate it into the mixture of starch and chalk.

DANDRUFF POMADE.

Salicylic acid	2	drams.
Boric acid	1	dram.
Vaseline	4	oz.
Cinnamon oil	10	mins.
Bergamot oil	20	„

Rub the salicylic acid and the boric acid in a mortar with a little of the vaseline, then add the remainder of the vaseline and the essential oils.

POMADE FOR BALDNESS.

Pilocarpin hydrochlorate	10	grains.
Balsam Peru	30	„
Precipitated sulphur	1	dr.
Benzoated lard	1	oz.

Dissolve the pilocarpin in a few drops of water and mix in a mortar with the other ingredients.

SOLUBLE PINE OIL DISINFECTANT.

Pine oil	60	parts.
Sulphonated castor oil	30	„
Oleic acid	9	„
Potassium hydroxide (solid)	1	part.

Mix the pine oil and the sulphonated castor oil together. Then add the oleic acid and dissolve the potassium hydroxide in the mixed oils.

CHOCOLATE PEANUT BARS.

Sugar	3	lbs.
Corn Syrup	3	„
Water	1	pint.

Cook to 240°F then add 8 pounds of roasted peanuts, and cook for 10 minutes. Remove from fire, and roll out on slab. Cut into small pieces, and then dip in chocolate.

TOOTH POWDER.

Precipitated chalk	60	parts.
Magnesium carbonate	1	part.
Magnesium oxide	2	parts.
Sodium bicarbonate	30	„
Castile Soap powder	6	„
Sodium chloride powder	5	„
Saccharine	0.2	part.
Wintergreen oil	1	„
Peppermint oil	0.4	„

SOAPLESS LIQUID SHAMPOO.

Saponin	2	parts.
Rose water	30	„
Perfume	1	part.
Alcohol	15	parts.
Distilled water to make	100	„

To prepare this,, dissolve the saponin in the rose water. Then add the alcohol containing the perfume, and make up the mixture to 100 parts by adding distilled water. It may be tinted yellow with a trace of yellow dye. Distilled-water may be substituted with rose water, and a little phenylethyl alcohol.

In the Field of Invention

IMPROVED METHOD OF CONSTRUCTING CATHODE-RAY TUBES.

An Improved Method of Constructing Cathode-ray oscillograph tubes has been developed using a flat glass base with chrome iron pins (Phillips Tech. Rev., 1947 9, 180). This has resulted in more space becoming available and make possible the introduction of improvements of an electron-optical nature without making the tube any larger. The new technique developed for mounting the electrodes ensures better centring. The tube has an electric screening that prevents the two pairs of deflecting plates affecting each other electrically at high frequencies.

RUST PREVENTION IN PACKAGING.

The Corrosion Of Steel and other metals under humid conditions can be prevented by wraping in paper impregnated with 5 per cent. solution of sodium benzoate (Patra, 1948, 2, 18). The production of wire-stitched boxes and books which do not develop rust stains, paper lebels for tins which do not become disfigured by rust spots, and simple non-rusting packing for needles and other metal articles, can be envisaged as a result of this work. The chloride content of paper should not exceed 0.1 per cent. by weight.

Experiments with related compounds showed that esters of benzoic acid, e.g. n-butyl benzoate, when used to impregnate paper are similarly effective in the form of vapour. The problem of preventing corrosion of metals in an enclosed space of air which may be sufficiently moist to allow eventual rusting, has been solved by making use of the slight volatility of the esters. The amount of ester required is small, just sufficient to saturate the enclosed package space.

—JOURNAL OF SCIENTIFIC & INDUSTRIAL RESEARCH.

BULK EVAPORATORS.

In evaporators, vacuum pans, digesters and other apparatus in which the liquid is evaporated by circulation through steam-heated tubes, the steam inlet pipe may be provided with vanes which diverge obliquely from the direction off the pipe. The walls of the adjucent pans are parallel to the vanes. The vanes direct the steam tangentially to the tube spade, which is divided into a number of compartments by tangentially arranged division plates. Steam passes from the tubes to an annular space formed by two walls, one defining the downtake and the other being perforated. The condensate formed is led off by a pipe at the bottom of the apparatus.

APPARATUS FOR REMOVAL OF BACTERIA FROM LIQUIDS.

Bacteria are removed from liquids or gases by contact with an anion-active material which is or has been, subjected to a high potential direct current. A suitable material is a formaldehyde condensation product of guanidine and urea. Voltages of up to 2,000 may be used with a current of 1 milliampere. In an apparatus for the removal of bacteria the anion-active material is housed in glass or porcelain vessel (if a metal container is used it should be lined with glass, rubber or porcelain) between two layers of glass wool with glass beads surmounting the top layer. The potential is applied between two platinum electrodes. The anion-active material may be activated or regenerated with sodium or potassium carbonate or hydroxide.—568,450, American Cyanamid Co.

—MANUFACTURING CHEMIST.

SYNTHETIC DETERGENT PREVENTS "FOGGING".

A new synthetic detergent, Duponol ME Dry, which causes moisture condensing on cold glass to spread in a uniform film over the surface, is the main ingredient of an antifogging compound now being made by E. I. Du Pont de Nemours. The compound consists of 700 gm. of Duponol with 90 gm. of tannic acid, 160 gm. of glycerin, 9 gm. of dye, and enough water to make an 8 litre solution. The formula is not patented and manufacturers may use it.

BARIUM CHLORIDE PRODUCTION.

A process for the manufacture of barium chloride from barytes and magnesium chloride, the cheapest source of chlorine, has been developed at the Department of Chemical Technology, Bombay University.

Barytes is roasted with wood charcoal and powdered. The pulverised material is then heated with 46-47% magnesium chloride solution at 90°—100°C, with stirring. It is claimed that the process yields cheap barium chloride which is suitable for the removal of sulphate impurities in brine, and sulphur is obtained as a by-product. Pilot plant production has commenced.

—MANUFACTURING CHEMIST.

Formulas, Processes & Answers

CATTLE FOOD.

Kullie or Maskulie (Woorid)	4	lbs.
Wheat bran (bhoosi)	2	„
Kullie, peas or rahar chosen bran	3	„
Mustard oilcake	2	„
Cotton-seed, gram or pea-meal	1	lb.
Green grass, chopped fine 30 to	40	lbs.
Salt	2	oz.
Sulphur	½	oz.
Wheat, barley or vats, etc., leaves and stalks.	10	lbs.

Mix. This mixture may be divided into two or more meals in 24 hours.

EMULSIFYING CASTOR OIL.

4694 S.D.S., Ambalangoda—Wants to have a recipe of preparing castor oil emulsions.

Castor oil	2	oz.
Powdered acacia	6	dr.
Peppermint oil	3	mins.
Powdered tragacanth	16	gr.
Saccharin	4	gr.
Glycerin	3	dr.
Cacao	2	dr.
Water to make	4	oz.

Boil the cacao with glycerine and water for 5 minutes. Make a mucilage of acacia with 4 dr. of the cacao mixture and gradually add the castor oil and peppermint oil by shaking. Contains trituration until emulsified. Then add the remainder of the cacao mixture.

SYRUP OF CALCIUM HYPOPHOSPHITE.

(B.P.)

4700 A.B.C., Indore—Desires to know a formula of preparing syrup of calcium hypophosphite.

Calcium hypophosphite	18.3 grms.
Hypophosphorous acid	2.5 „
Sucrose	800.0 c.c.
Distilled water to produce	1000 c.c.

Dissolve the calcium hypophosphite with the aid of the hypophosphorous acid in 450 c.c. of distilled water, filter the solution, add the sucrose to the filtrate, and after this had been dissolved by agitation, add sufficient distilled water to make the product measure 1000 c.c.

PREPARATION OF WHITE LEAD.

4743 K.S., Hyderabad—Desires to know a process of preparing white lead.

White lead is manufactured on a large scale by several processes, the oldest of which yielding the best product is known as the Dutch method. It depends upon the action of acetic acid on metallic lead, in the presence of moist air and carbon dioxide. The lead, cast into rough gratings in order to expose a large surface is placed in earthenware pots. A small quantity of dilute acetic acid is placed in the pots and the gratings of lead, which rest upon the shoulder of the pot, are piled one upon the other. These pots are then placed upon a thick bed of spent tanbark (Cow-dung), upon the floor of a shed, and covered with planks. Upon these another layer of tanbark is spread, and a second row of pots similarly charged. In this manner the layers of pots are built up to the roof of the shed, and the whole allowed to remain for about three months. Such a stack will contain many tons of lead, and about 65 gallons of dilute acetic acid to per ton of metal The acid is gradually vapourised by the heat developed by the fermenting tanbark, which results first in the formation of a basic lead acetate.

The basic acetate is then acted upon by the carbon dioxide evolved during the fermentation, with the production of a mixture of normal lead acetate and basic lead carbonate. And the lead acetate, in the presence of air and moisture, reacts upon a further portion of the metal, regenerating the basic acetate, which is once more decomposed by carbon dioxide.

In this cycle of reactions the acetic acid acts as a carrier, a comparatively small quantity being able to convert an indefinite amount of lead into white lead.

GRAPHITE WHEEL GREASE.

4787 P.B., Naihati—Wishes to have a good formula of preparing graphite wheel grease.

Mix 80 parts of tallow and 20 parts of very fine graphite; melt the fat in a varnished earthen vessel; add the graphite while constantly stirring until it is cold, for otherwise the graphite, on account of its density, would not remain in suspension in the melted fat.

ICE CREAM.

4842 S.N.S., Gaya—Desires to have a process of making ice cream.

Powdered starch	1	oz.
Powdered sugar	1	„

Orange dye		q. s.
Essence of almond	10	mins.
Essence of vanilla	10	„

Mix well and sift.

The above quantity is sufficient for a pint of milk which it is to be mixed, then brought to the boil, and when cold put in the freezer. Other colourings and flavours may be used according to taste.

SLATE PENCIL.

4853 P.D.V., Satna—Wants to know a process of making slate pencil.

Ground slate	60	parts.
Ground limestone	30	„
Silicate of soda	10	„

Knead the ingredients together into a plastic mass and then force through a perforated slate. The pencils are next cut into desired sizes when dry. The shaping is done by laying the pencil in a trough, the bottom end being gripped automatically in a holder which revolves at an angle, and the end is held against a rough stone revolving at high speed in water.

ADHESIVE FOR ENVELOPE.

4856 G.A., Nedublobe—Wishes to have a formula of preparing adhesive for envelope.

(a)	Dextrin, white	200	parts.
	Water	240	„
(b)	Boric acid	2	parts.
	Glycerine	5	„
	Water	20	„
(c)	Thymol (10% alcohol solution)	½	part.

Dissolve (a) at 90 C, add (b), and ultimately (c) as preservative.

OFFICE ADHESIVE.

4861 S.S.M.R., Krishnarajnagar — Wishes to know a formula of preparing office adhesive and also a formula of vanishing ink.

Yellow dextrin	15	parts.
Water	20	„
Sugar	2	„
Vinegar (3 p. c.)	5	„
Salicylic acid	1/10	part.
Citronella oil	1	„

Dissolve the dextrin in boiling water and sugar. When all is dissolved mix the vinegar and other ingredients. Lastly keep aside to cool.

VANISHING INK.

Write with a strong solution of cobalt chloride, which on drying the writings will be invisible. Now on holding the paper over fire writings will appear in green colour. These will disappear on keeping and again reappear on warming.

SCENTED HAIR OIL.

4939 M.G.K., Dacca — Wants to know a good formula of scented hair oil.

Castor oil	16	oz.
Rectified spirit	3	„
Nutmeg oil	30	drops.
Rosemary oil	10	„
Sweet marjoram	10	„
Neroli oil	10	„
Otto rose	20	„
Essence of musk	1	dr.
Alkanet root	½	oz.

Mix the alkanet root with castor oil and keep aside for a day or two. Then strain through a cloth and mix the other ingredients one by one into the oil. Shake vigorously after each addition and then keep for 4 days, when it will be ready for use.

CITRIC ACID FROM LEMON JUICE.

4961 S.S.H., Bhilwara—Wishes to have a process of preparing citric acid from lemon juce.

Lemon juice	4	pints.
Prepared chalk	4½	oz.
Diluted sulphuric acid	27½	„
Distilled water	2	pints.

Heat the juice in an earthen or porcelain vessel, add the chalk; let the powder subside, and pour off the liquor. Wash the citrate of lime frequently wih warm water, pour on it the sulphuric acid and water, and boil for 15 minutes; express the liquor, filter it, and evaporate with a gentle heat; then set it aside to crystallise. To obtain the crystals pure, dissolve them a second and third time, filter each solution, evaporate, and set it aside to crystallise.

GOLD THREAD.

5012 D.C.D., Calcutta—Wishes to have a process of making gold thread.

Gold thread is made from wire consisting of a part of copper added to 25 of silver, which is afterwards coated with gold. But alloys of copper and silver in many proportions are used, some wires containing one of silver to 60 of copper. The alloy of silver is next made into a rod 1½ inches in diameter, and then annealed to prepare it for its coating of gold. This is laid on in the form of leaves of pure gold, and subjected to the fire-gilding process; that is, the gold coated rod is heated and redness on burning charcoal, which causes the leaf to adhere firmly. Rods so treated are next smeared with wax, and drawn through the holes of a steel draw-

plate. The wire is frequently annealed during the process of drawing, and this requires to be very skilfully done. or the golden tint of the surface is lost.

When the wire becomes ¼ inch thick by passing and re-passing through an iron press, it is flattened by means of hammer or by passing between polished steel rollers. Finally the flat-wire is twisted round a cord of orange coloured silk.

NUT BUTTONS.

5070 R.G.S., Sira—Wants to know a method of making nut buttons and also mango preserves, lemon syrup, etc.

Nut buttons are made from an odd kind of nut called Dommets of Africa and is sometimes harder than wood, but not quite so hard as ivory.

The manufacturers of buttons from this nut is a serious of steps involving many operations and considerable time before the finished product is ready for the market. At first the nuts are dried from three to six weeks, and then they are placed in revolving drums containing weights which crack off the hard shell. After this they are taken to the "scabbing table", where they are inspected for small particles of the shell which may not have been removed. From the "scabbing table" they are cut into pieces of slabs. The slabs are put through a period of drying to prevent any warping, after which they are again sorted by machinery before going to the "turning room". Here they are put into a hot bath to moisten the outer surface and prevent cracking, after which they are placed on the lathe and rapidly turned into a finished button blank.

The blanks are next bored with necessary holes by means of automatic drilling machines. They are then placed in "tumbling barrels" containing polishing material, which gives a very smooth surface and prepares for dyeing.

If the buttons are to be mottled, they are first soaked to open the press, then placed face up on a pin board, which goes to a dyer, who places a chart over the board and with the aid of an air brush sprays the buttons with a "resist dye". The chart is removed and the board goes to a second dyer, who with the aid of a similar chart sprays the buttons with the colour dye.

The buttons are well dried, taken from the pin board and placed in a bath, or "developer", which brings out the spray coloured and makes it fast. The "resist" is now removed, and the button is complete though dull in appearance. In order to bring out the colour and finish the buttons are again put into the polishing drum, and when taken out have a high lustre. After the buttons have been coloured they are submitted to the finishing processes. These are known as buffing, hand polishing, automatic and machine polishing; pressing, carving; milling; sandblasting; shanking, stain finishing, lettering and so forth. The finished buttons are then sorted and stitched into cards.

MANGO PRESERVES.

Prepared Mango	2 lbs.
Sugar	2 „
Water	2 „

Peel, and cut the fruits in proper sizes. Dissolve the sugar in water, and boil. Then add the mango pieces and boil the whole for half an hour or until the fruit is cooked, and the syrup is thickened heavily. Then remove from the fire, and allow it to cool; then pour into jars, and seal.

LEMON SYRUP.

Sugar	8 ch.
Water	1½ seer.
Citric Acid	as directed.

Prepare an ordinary syrup by boiling refined sugar in water for 10 minutes over a slow fire. Then add to this citric acid, the usual proportion being 1 dram of the acid to 6 oz. of the syrup. For securing cheapness sometimes dilute sulphuric acid is used in place of citric acid, the proportions remaining same.

ORANGE SYRUP.

Tincture Orange	1 oz.
Ordinary Syrup	7 oz.

Prepare ordinary syrup by boiling sugar in water in the proportion of 1 of sugar to 3 of water. To every 7 oz. of the syrup now add 1 oz. of tincture of orange, which gives the required syrup.

TOBACCO FLAVOUR.

5108 G.M., Tatanagar—Wants to have a good recipe of flavouring tobacco cigarette.

Calamus	2	oz.
Orris root	6	oz.
Essence of white rose	6	dr.
Lavender oil	20	mins.
Rose geranium oil	40	„
Alcohol (70 p.c.)	40	„

Exhaust the powdered solids by percolation with the alcohol to 2 pints, and add the other ingredients.

SILICATE OF SODA.

5126 P.P.W., Porbandar—Wishes to know a good formula of silicate of soda.

Sodium silicate comes into commerce in the form of a thickly fluid and tough mass, obtained by fusing together quartz and with soda. In order to prepare it mix 15 parts of fine quartzsand with 8 of sodium carbonate

and 1 of wood charcoal powder and fuse the mixture in a crucible. The contents of the crucible, when cold, is taken out, pulverised and exposed to the air, being stirred frequently during the time. The powder is then several times washed with cold water, and then boiled with 5 parts of water until all is completely dissolved. The solution is then filtered and evaporated to a specific gravity of 1.25. In this manner a sticky, syrupy liquid is obtained which, on exposure to the air, dries to a transparent glass.

Another recipe follows:—

Mix 45 parts of quartz sand, 23 of anhydrous sodium carbonate, and 3 of wood charcoal powder. This mixture is easier to fuse.

HAIR DYE POWDER.

5159 B.M.L., Jammu—Wishes to have good recipes of hair dye powder, hair dye tablets, etc.

Para-toluylene diamine	25	grm.
Sodium sulphite, crystallised	50	„

Mix. For use, dissolve 7½ grms. in 100 c.c. of water, and add to it a little hydrogen peroxide and then apply over the hair with a camel-hair brush.

HAIR DYE TABLETS.

Amino diphenylamino-mono Sulphuric acid	40	grms.
Sodium carbonte	20	„

Press into tablets. For use, dissolve a tablet of about 6 grm. in 100 c.c. of water, and add 5 grms. of sodium perborate or sodium persulphate. Then apply as usual.

COLD SEALING WAX.

(a)	Cellulose acetate	200	grms.
	Acetone	800	„
	Castor oil	40	„
(b)	Lithopone	250	„
	Acetone	250	„
	or		
	Ultramarine blue	150	„
	Acetone	250	„
	or		
	Copper bronze	150	„
	Acetone	250	„

Make the lacquer (a) and then this with pigment—suspension (b), for white, blue or gold colour using suitable pigment.

SNOW.

Stearic acid	24	lbs.
Pot. carbonate	5	„
Glycerin	8	„
Water	12	gals.

Perfume with rose jasmine or compound scent.

Heat the glycerin, pot.-carbonate and water together to 200°F and add stearic acid (previously heated to 200°F) to it slowly with stirring in an emulsifier or whipper. Continue stirring until the mass is homogeneous. Allow to stand overnight. Next add the perfume and mix for 20 minutes. This cream is softer than the old-fashioned creams but typifies the highest grade modern vanishing cream. The pearliness in this cream increases with age and is helped by stirring cold the next day.

GREEN FOUNTAIN PEN INK.

Emerald green	1	oz.
Naphthol green	1	„
Gum arabic	¼	„
Hot water	100	fl. oz.
Boric acid	50	grms.
Rect. spirit	1	oz.

Dissolve the ingredients in hot water and keep aside to cool. Then add the rectified spirit and bottles.

DISTILLED WATER.

5177 M.C.R., Manikpur—Wants to know a process of making distilled water and also recipes of handkerchief scent.

Distilled water is usually prepared by distilling ordinary water with suitable precautions. For this purpose, take a tinned copper boiler furnished with a special still head and with a serpentine condenser of block tin. Pour the water into the boiler and heat to boiling. The steam issuing out of the boiler is passed through the condenser which is kept cool, whereby the steam is reconverted to water and collected in receiver. Care is necessary that the water does not boil violently, otherwise impurities will make their way along with steam. Reject the first portion of the distillate, which contains carbon dioxide and ammonium carbonate the presence of which are recognised by the turbidity they produce in a solution of lead acetate. If the water contains magnesium chloride, add a little lime before distillation to prevent the hydrochloric acid from distilling. In this case, also reject the first portion of the distillate because it contains ammonia from the ammoniacal salts; the remainder of the distillate is pure water. It is, however, necessary to leave the last portion of the water undistilled, because certain organic substances commence to decompose yielding impure distilled water.

Brief Queries and Replies

2022 R.S., Pilibhit—For starting an ice factory you have to invest at least Rs. 50,000/-. Ice making plants may be had of M. S. Vernal & Co., Bharat Insurance Bldg., Chittaranjan Avenue, Calcutta and Masseys (India) Ltd., Royapuram, Madras.

2023 S.T.C., Bhimavaram—For tea you may enquire of A. Tosh & Sons, 11/1, Harrison Road, Calcutta; B. K. Saha & Bros. Ltd., 5, Pollock Street, Calcutta and Lipton Ltd., 9, Weston Street, Calcutta. For castor oil write to Panchkari Tat & Sons Ltd., 6. Meerbohar Ghat Street, Calcutta and Khimjee Hansraj, 165, Lower Chitpur Road, Calcutta.

2025 M.T.S., Dacca — For wood working machine enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta; Alfred Herbert India Ltd., 13/3, Strand Road, Calcutta and Standard Machinery Co., 86B, Netaji Subhas Road, Calcutta.

2029 B.D.C., Kanpur — Process of manufacturing pulverised gum acacia, asprophine, etc. will appear in an early issue of Industry.

2030 C.A.R., Bezwada—Detail information regarding enamelling and ceramic photography will be found in Independent Careers for the Young published from this office, price Rs. 3/6/- including postage.

2031 R.G.V., Ahmedabad—Springs may be had of Swami & Co., 40-1, Strand Road, Calcutta; Sheffield Spring & Steel Co., 135, Canning Street, Calcutta and Calcutta Spring Mfg. Co., 84A, Netaji Subhas Road, Calcutta. For calendar enquire of Tower Halftone Co., 14C, Kapalitola Lane, Calcutta and Imperial Art Cottage, 1A, Tagore Castle Street, Calcutta.

2032 R.R., Jodhpur—Process of manufacturing plaster of paris has appeared in January 1948 issue of Industry; and tin slate will appear in an early issue of Industry.

2033 L.C.C.C., Delhi—Bakelite goods are manufactured by India Moulding Co., C2, Bharat Bhavan, Chittaranjan Avenue, Calcutta and Swadeshi Industries Ltd., Jaipuria House, 132, Vivekanada Road, Calcutta.

2034 H.L.B., Jullundur City—You may apply the following size to thread manufactured by you: Glue 7 oz.; glycerin 16 fl. oz.; water q. s. Pour on the glue more than enough water to cover alone to macerate for several hours, then decant the greater portion water; apply heat until the glue is dissolved, and add the glycerin. If the mixture is too thick, more water may be added. It may be coloured by means of an aniline dye dissolved in alcohol. The addition of a little calcium chloride also tends to prevent the glue from cracking. The thread to be sized to any desired colour may be rubbed with glue tinted with the dye by means of a sponge dipped in the glue.

2041 H.M.K., Ahmedabad—Hindi equivalent of Burgandy pitch is not available.

2045 S.K.M., Bombay—Following is a list of newspapers: Statesman, Chowringhee Square, Calcutta; Amrita Bazar Patrika, 12 Ananda Chatterjee Lane, Calcutta; Rangoon Daily News, 1, Merchant Street, Rangoon; Rangoon Gazette, 379, Sparks Street; Rangoon; Ceylon Observer, Lake House, McCallum Road, Colombo and Times of Ceylon, Colombo.

2046 B.S.I.F., Ahmedabad—For ice candy making machine enquire of M. S. Vernal & Co., Bharat Insurance Bldg., Chittaranjan Avenue, Calcutta and Refrigerators (India) Ltd., Bhawanipore Road, Calcutta.

2047 P.C., Jharia—For bleaching powder you may enquire of Alkali & Chemical Corporation of India Ltd., 18, Strand Road, Calcutta and Tata Chemical Corporation of India Ltd., Bombay House, 24, Bruce Street, Fort, Bombay.

2048 C.R.R., Tirupparamkumam—Address of Calcutta Stock & Share Dealers Ltd., is 8, Royal Exchange Place, Calcutta.

2049 P.L.A., Benares—For bucket making machines enquire of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta. For pulse milling machine enquire of Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta. You may start the industries with the capital you have. But subsequently you have to invest more. These industries have prospect.

2050 P.N.G., Golaghat—There is no institute where training is given on fisheries. You may however write to the Fisheries Deparment of your province. For poultry farming and beekeeping you may enquire of Khadi Partisthan, 15, College Square, Calcutta.

2051 V.G.N.S., Ajmer—For the book you may write to M/s. Thacker Spink & Co. Ltd., 3, Esplanade East, Calcutta. For purchasing the plaster of paris you may write to M/s. Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane Calcutta. Gypsum is found in Bikaner, Kashmir, Rewa, Gujranwalla, Trichinopoly, Dehra Dun and Jhelum districts in India. The process of manufacturing plaster of paris from gypsum has been described in January 1948 issue of Industry. For technical advice you may consult: Morton Evans & Co., P.O. Box 1230, Bombay.

2052 P.C.C., Benares City—The process of making acid blue, coumarine and benzyl acetate will be published in Industry according to the usual rotation rule.

2053 J.D.G., Patna—For confectionery machine write to M/s. Small Machineries Co.

22, R. G. Kar Rd., Calcutta. For the colour and essence you may write to M/s. Ghose Bros., 50, Ezra St., Caltucta.

2057 A.W.F.S., Bezwada—For your information regarding clocks you may write to M/s. West End Watch Co., 49, Esplanade Rd., Bombay and M/s. Favre-Leuba & Co. Ltd., 217-219, Hornby Rd., Bombay.

2058 P.S.C., Jodhpur State—The process of making neem soap will be published in Industry according to the usual rotation rule.

2060 J.N.. Delhi—We have no publication on hosiery industry.

2061 T.B., Hoshiarpur—For the inkpots and bottles you may write to M/s. Essence & Bottle Supplying Agency, 14, Radhabazar St., Calcutta. Ink and hair oil industry has good prospects if properly handled. The cosmetic industry includes such articles as snows, creams, face powders, lipsticks, rouges, nailpolishes etc.

2063 F.P.R.K.R., West Godavari—For the colours you may write to M/s. Excel Trading Corpn., Kastur Chand Mills Estates, Dadar, Bombay.

2065 A.P.C., Jamnagar—It is difficult for us to follow you.

2068 L.K.G., Kanpur—You may write to Banshidhar Dutta, 126, Khengrapatty St., Calcutta.

2069 P.S.W., Purulia—You are requested to supply us the formula you use in preparing the soap.

2071 A.I.L., Srirangam—For the paint machines you may write to M/s. Killick Nixon & Co. Ltd., Home St., Bombay.

2072 S.S.N., Delhi—As special precaution is generally necessary for preparing soap in rainy season. To prevent excessive solubility of the soap you may use fillers like wheat starch, silicate, paraffin wax, etc. The addition of a little animal fat will also prove useful. For technical advice you may write to the Director. Industrial Research Laboratory, 22, R. G. Kar Road, Calcutta 4.

2073 P.G.M., Bhavnagar—You may consult our publication "Practical Metal Casting" which we hope may prove to be useful to you.

2075 M.B.K., Trichinopoly—Your name is being published in our trade enquiry column in Industry.

2078 O.N.T., Bareilly—For glass and crockery you may contact M/s. Janakidas & Co., 26F, Connaught Place, New Delhi.

2082 I.C.M.C., Bhadohi—The hydrogenation of vegetable oils is not a small scale industry. For the machines and plants you may write to M/s. Vasant Industrial & Engineering Works, 470-71, Worli Rd., Bombay 18. For the books write to M/s. Thacker Spink & Co. Ltd., 3, Esplanade East, Calcutta.

2084 N.F.H., Salem—For the distributor of colgate products you are to write directly to the manufacturer. For the toilet powders you may write to M/s. Whiteaway Laidlaw and M/s. O. N. Mukherjee & Co. Ltd., Calcutta.

2085 E.B., Bangalore—The starch from tamarind seed is not to be used for edible purposes. It is mainly used as a sizing material in textile and jute industry. The starch is obtained by powdering the seed after removing the outer skin.

2087 G.G.P., Dharwar—You may write to M/s. Scientific Supplies (Bengal) Co., College St. Market, Calcutta for the chemicals and apparatus. For postal training you may write to the Director, Industrial Research Laboratory, 22, R. G. Kar Road, Calcutta.

2091 B.P.M., Katni—For the chemicals you may write to M/s. Scientific Supplies (Bengal) Co., and M/s. Nadia Chemicals, both at College St. Market, Calcutta.

2095 R.L.K.C., Almora—For all necessary details regarding the oil milling machine you may consult M/s. Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extn.. Calcutta and M/s. Bhartiya Engineering Works, 370, Chitpur Rd., Calcutta.

2096 M.M., Assam—For all necessary information regarding the silicate plant you may consult M/s. Chemical Plant & Equipment Ltd., 7, Lower Chitpur Rd., 2nd Floor, Calcutta. For a clear idea about slate industry, you may consult our publication "Manufacture of School Slate", price Rs. 1/8/- only, postage extra.

2097 B.N.D., Patna—For the hosiery machines you may write to M/s. W. H. Brady & Co. Ltd., Mercantile Bldg., Lall Bazar, Calcutta and M/s. A. N. Sayal & Sons, 76, Ramnagar, New Delhi.

2098 J.S.R.M., Garo Hills—For the chemicals you may write to M/s. Scientific Supplies (Bengal) Co., College St. Market, Calcutta.

2099 V.P.P., Mehmadabad—Casein may be prepared from skimmed milk by adding acid and separating the channa therefrom. The channa is the dried and powdered fine.

2100 A.T.V., Malabar—For lozenge making machine and all necessary information regarding the same you may write to M/s. Small Machineries Mfg. Co., 22, R. G. Kar Rd., Calcutta.

2101 K.N., Bellary—Indian Minerals is published by Manager of Publications, New Delhi.

2102 E.I.B.F., Karimganj—For biscuit drying machine enquire of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

2103 K.C.N.B., Quilon—Mantles are manufactured by B. K. Shaw, 3, Beadon Street. Calcutta; Bengal Scientific & Technical Works, P513, Rash Behari Avenue. Calcutta and National Mantle Mfg. Co., 386, Vithalbhai Patel Road, Bombay 4. Process of manufacturing confectionery will be found in Manufacture of Confectionery published from this office, price Rs. 3/6/- including postage. Confectionery machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

2104 K.N., Lucknow—We have no book in Hindi. For yeast write to Rajaram & Co., 37, Grant Street, Calcutta.

2105 K.N.B., Hissar—Let sodium silicate set on iron sheet, when perfectly dry dip in calcium chloride solution.

2106 B.N.B., Dinajpur—Process of manufacturing rubber stamp will be found in Manufacture of Rubber Goods published from this office, price Rs. 3/6/- including postage. Rubber stamp making equipment may be had of B. Goray & Co., 156, Cornwallis Street, Calcutta.

2107 H.S.S., Tarn Taran—Process of manufacturing grinding wheel will appear in an early issue of Industry.

2108 B.D., Ghaziabad—Following is a formula of ink powder: Methylene blue 4 oz.; methyl violet ½ oz.; gum acacia powder ½ op.; sugar ½ oz.; boric acid 1 dr. Mix. Following is a formula of nail polish: Celluloid film cut small 200 gr.; amyl acetate 2 oz.; acetone 5 oz.; spirit red 80 dr. Clean the celluloid film by soaking it in soda solotion for 2 or 3 hours, then scrape with a blunt knife. Dry in the sun. Then cut it into small pieces and weigh out and put in the mixture of acetone and amyl acetate in a well stoppered bottle. Then add the colour. Keep aside for a day or two; then strain and bottle.

2109 B.D.N.L., Shillong—Small embroidery machine may be had of L. Mullick, 183, Dharamtala Street, Calcutta.

2110 L.M.M., Bangalore—Khasari is a kind of peas available in Bengal and Bihar. You may use any kind of peas available in your place.

2112 S.S.L., Jhansi—For training in automobile engineering you may write to French Motor Car Co. Ltd., 234-3, Lower Circular Road, Calcutta.

2114 B.R.S., Johore—A good recipe of gripe water will appear in an early issue of Industry.

2117 A.A., Lucknow—We are not aware of any firm that will manufacture soap and vegetable ghee under your own brand. You may however write to the following firms: Benares Soap Works, 231, Manicktolla Main Road, City Soap Works, 346, Manicktolla Main Road and Dacca Soap Co., 1, Barmari Lane, all of Calcutta.

2118 A.S.M., Dacca—You may add sandal oil to the hair oil manufactured by you.

2119 R.K.T., Surat—You may refer your query to the High Commissioner for India, India House, Aldwych, London, W.C.2.

2120 R.M.S., Bombay—Following is a list of machinery merchants: Agarwal Engineering Co., 30, Strand Road, Calcutta; Alfred Herbert (India) Ltd., 13-3, Strand Road, Calcutta; Burn & Co., 12, Mission Row, Calcutta; Record Engineering Works, 1st Pathan Street, Bombay; Greaves Cotton & Co. Ltd., 1, Forbes Street, Bombay and S. R. Bomanje, Forbes Street, Bombay.

2121 P.S.W., Purulia—Wants to know the address of Udyog.

2122 M.P., Yeotmal—Put the butter in refrigerator or dry ice for making it hard block.

2123 G.M.A., Colombo—A good formula of eaudecologne will appear in an early issue of Industry.

2124 C.H.W., Kalimpong—For rice hulling machine enquire of Marshall Sons & Co. Ltd., 99, Netaji Subhas Road, Calcutta.

2128 B.K.M.M., Amritsar—Printed tin can may be had of National Sheet & Metal Works Ltd., 36A, Sahitya Parishad Street, Calcutta and Metal Box Co. of India Ltd., B2, Hide Road, Kidderpur, Calcutta. For alcohol enquire of Bengal Distilleries Co. Ltd., Konnagar, Hooghly and Chowringhee Stores, 55, Chowringhee, Calcutta.

2129 S.P.V., Mysore—There is no restriction for starting an introduction league and crossword puzzles and mail order business.

2130 V.T.S.K.C.W., Coimbatore—Process of manufacturing fountain pen ink will appear in an early issue of Industry.

2131 C.A.O., Trichur—You may try the following formula of adhesive for affixing labels on tin: Gum tragacanth 1 oz.; gum acacia 4 oz.; thymol 14 grains; glycerine 4 oz.; water sufficient to make 2 pints. Dissolve the gums in 1 pint of water, strain, and add the glycerine in which the thymol is suspended, shake well and add sufficient water to make 2 pints. This separates on standing, but a single shake mixes it sufficiently for use.

2135 M.M.J., Travancore—For selling the estate you should advertise in newspapers.

2138 J.S.M., Balaghat—Recipes of pain balm and skin disease etc., will be found in Pharmaceutical Preparations which you have already got.

2141 E.S.R., Madras—Tattooing machine may be had of Scientific Supplies (Bengal) Co., C37, College Street Market, Calcutta and Scientific Instrument Co. Ltd., 11, Esplanade East, Calcutta.

2143 S.C., Patna—For chalk crayon making machine ensuire of Small Machineries Mfg. Co., 22, R. G. Kar Rd., Calcutta.

2144 N.H.F., Lucknow—For manufacturing candle melt hard paraffin and pour into candle moulding machine fitted with wicks. Candle moulding machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

2146 R.N.S., Nowgong—For manufacturing aluminium utensils you have to use sheet metal working machines which may be had of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta. For this purpose you have to invest Rs. 50,000/-.

2149 B.N.D., New Delhi—For cardboard boxes you may enquire of Bengal Cardboard Industries & Printers Ltd., 165, Cornwallis Street

Calcutta. Following is a recipe of gripe water: Spirit ammaico 3 dr.; potash bicarbonate 1 oz. 3 dr.; simple syrup 32 oz.; aqua caraway concentrated 1 oz.; aqua anise concentrated ½ oz.; aqua anethi, concentrated 2 oz.; distilled water 4 fl. oz. Dissolve all the ingredients in the distilled water one by one. Dose for an infant half a teaspoonful, two months old, one or two teaspoonfuls. The dose may be gradually increased.

2153 S.M., Dharwar—For chemicals you may enquire of Calcutta Chemical Co. Ltd., 5, Bonfield Lane, Calcutta. For practical training write to Industrial Research Laboratory, 22, R. G. Kar Road, Calcutta.

2154 P.C., Bombay—Import figure of paint brushes is not available. Before making the brushes treat the bristles in a weak alkali solution.

2155 A.P., No address—A good formula of magic serpent will appear in an early issue of Industry.

2159 M.B., Nowgong—Process of manufacturing caustic soda appeared in July 1948 issue of Industry.

2160 S.A.H., Delhi—Please let us know what you mean by mica water. If you wish to use mica dust in lacquer you may use cellulose varnish by adding mica dust in oil.

2164 J.R., Agra—For selling the articles you deal in, please advertise in newspapers.

2165 D.C.T., Meerut City—Process of manufacturing tin slate will be found in Manufacture of Slate by Durga Pershad published from this office, price Re. 1/4/- including postage.

2167 R.M.G., Jagraon—Dairy machines may be had of Edward Keventers Ltd., 11/3. Lindsay Street, Calcutta and Volkart Bros., 8, Netaji Subhas Road, Calcutta.

2168 J.S., Bangalore—Your enquiry is unintelligible.

2169 E.T.C., Trichinopoly—Coffee may be had of Bharat Coffee Co., Koppa, Mysore State; Coffee Curing Works, Mangalore; Coimbatore Coffee Curing Works, Tellicherry and Hunsur Works, Hunsur, Mysore. Tea may be had of A. Tosh & Sons, 11/1. Harrison Road; B. K. Saha & Bros., Ltd., 5. Pollock Street and Orphan Tea Co., 18, Raja Woodmunt Street, all of Calcutta.

2170 S.K.D., Mymensingh—Process of manufacturing hair oils and essences will be found in Indian Perfumes, Essences & Hair Oils published from this office, price Rs. 3/6/- including postage. All sorts of ink making formulas will be found in Manufacture of Ink published from this office, price Rs. 3/6/- including postage. Tin box making machines may be had of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta.

2173 B.H., Baroda—Process of manufacturing red enamel will appear in an early issue of Industry.

2174 S.A.S.R., Karaikudi—Spectacles grinding stone may be had of Lawrence & Mayo (India) Ltd., 11, Government Place East, Calcutta and Walter Bushnell Ltd., 21, Old Court House Street, Calcutta. Home printing machines may be had of India Machinery Co. Ltd., 20, Strand Road, Calcutta. You may use nickel for making watch dials. Wants to buy fused bulbs in large quantity.

2175 S.B.S., Lakhisarai—It is not possible to work an ice cream machine withoht electricity.

2176 C.C. Delhi—You may use salicylic acid, potassium metabisulphite and potassium benzoate as preservative for medicinal syrup Proportion of the preservative should be one thousandth part of sugar used.

2177 S.L.S., Bijainagar—You may start a soap factory with Rs. 10,000/-. Soap making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. You may also start candle manufacture. For paraffin enquire of Burmah Shell Oil Storage & Distributing Co. Ltd., Hongkong House, Dalhousie Square, Calcutta.

2178 S.N.M., Serampore—For practical training on soap manufacture you may write to the Chemical Director, Industrial Research Laboratory, 22, R. G. Kar Road, Calcutta.

2179 P.C.D.L., Jagadhri—Process of electroplating will be found in Electroplating in Practice published from this office, price Rs. 3/6/- including postage.

2181 H.B., Calcutta—Cream separators may be had of Volkart Bros., 8, Netaji Subhas Road, Calcutta and Edward Keventers Ltd., 11-3, Lindsay Street, Calcutta.

2182 K.W.P.D., Haputale—Sandal wood oil may be had of Government Sandal Wood Oil Factory, Mysore; Sandal-wood Oil Factory, Kanauj and Debiprasad Prayagdutt Pandit, 89, Lower Chitpur Road, Calcutta.

2183 B.R.T., Jaipur—Molasses should be 1 gallon and acetic acid 4 lbs.

2184 P.K.S., Calcutta—For joining broken pieces of guttapercha you may use Canada balsam and for joining celluloid you should use amyl acetate which is a solvent for celluloid.

2185 B.N.D., Uirshachat—All the ingredients required may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta.

2186 A.R.M., Nairobi—Wants to be put in touch with the exporters of piecegoods and handkerchief from India to S. Africa. Essential oils may be had of Hindusthan Aromatics Co., Naini, Allahabad, and Chhediram Moolchand, Perfumery Kothi No. 32, Kanauj. Dhupbatti may be had of Mysore Anand Dhoop Factory, 141, K T. Road, Mysore; Mysore Agarbatti Co., 1, Madar Sahid Street, Bangalore City and Sree Satyanarayan Parimal Facory, Jagmohan Palace Square, Mysore. Following is a formula of Eau-de-Cologne: Bergamot oil 1 oz.; lemon oil ½ oz.; orange oil 2 dr.; rectified spirit 2 lbs. Mix the ingredients one by one with brisk shaking. Set

the whole aside in a stoppered bottle for a fortnight. During this period shake the bottle thrice daily. Finally filter and pack.

2188 D.R.M., Delhi—Following is a formula of hair dye: Diamedophenol hydrochloride 150 grms.; sodium sulphite 250 grms.; rectified spirit 100 c.c.; distilled water 900 c.c. Mix. To apply wash the hair with soap to remove oil and grease and dry. Then apply the dye with a soft brush when the desired shade has developed. wash the hair with sampoo.

2190 P.P., Sholapur—Sheet metal working machines may be had of Alfred Herbert (India) Ltd., 13-3, Strand Road, Calcutta.

2194 M.G.C., Surat—Detailed process of manufacturing phenyle will be found in Manufacture of Disinfectants published from this office, price Rs. 3/6/- including postage.

2195 N.G.S., Nagpur—10°Be denotes the strength of the lye measured by Beaume's hydrometer 40° Tw signifies the strength of the lye measured by Twaddles hydrometer. Further particulars will be found in the book Manufacture of Soap which you have already got.

2196 K.C., Colombo—We have no book on alcohol manufacture. Yo may however enquire of W. Newman & Co., Ltd., 3, Old Court House Street, Calcutta for the book required.

2197 A.S.D.B., Madura—Candle making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta and Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

2202 V.M.E.W., Indore City—You may arrange for mass production and appoint agents for your rolling mills in Calcutta, Bombay, Madras, Delhi and Karachi. For appointing agents you should advertise in local newspapers offering your terms of business. For steel bars enquire of Balmer Lawrie & Co., Ltd., 103, Netaji Subhas Road, Calcutta.

2203 P.S.W., Surat—Process of manufacturing all sorts of soap will be found in Manufacture of Soap which you have already got. You may use any sort of tallow in soap manufacturing. Soap making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

2204 Z.A., Abbottabad—Formula of manufacturing soap with mustard oil, sodium carbonate and lime will appear in an early issue of Industry.

2206 K.B., Kanoor—For selling box honey you should advertise in newspapers.

2211 E.M., Kurnool—Process of manufacturing manure and glue from bones appears elsewhere in this issue.

2214 J.D.A., Jalna—In extracting nitric acid from copper nitrate follow the same process as you followed in extracting nitric acid from potassium nitrate, but you should take copper nitrate in half quantity.

2215 K.N.G., Hardwar—Almost all the formulas published in Industry are tested.

2216 B.K.T., Tanda—Reduce the quantity of glycerine to ½ part.

2217 C.J.P., Unjha—Process of manufacturing synthetic indigo will appear in an early issue of Industry.

2220 T.R.C., Coimbatore—For selling cloths you may negotiate with the following firms: Mohamed Aboobacker & Co., 71, Edward Street. and M. A. Mohamed Ali, 186, Mg. Tulay Street, both of Rangoon.

2222 K.L.R., Godavari—You may start ink manufacture both powder and liquid with Rs. 200 on a small scale. You may also start manufacture of masala powder and betelnut powder with the above sum. As regards agency business you may try to take agency of those firms that are not represented in your place.

2223 A.C.K.P., Feroke—You may try the first formula of ink powder but reduce the quantity of methylene violet to ½ lb. This will give you very good blue-black ink.

2225 G.P., Tadpatri—Ready-made splinters are not available. You have to make splinters yourself. Ingredients for agarbatti manufacture may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta. Boot polish making ingredients may be had of Calcutta Chemical Co., Ltd., 5, Bonfield Lane, Calcutta. Tin cans may be had of National Sheet & Metal Works Ltd., 36A, Sahitya Parishad Street, Calcutta. Soap making materials may be had of Calcutta Mineral Supply Co., Ltd., 31, Jackson Lane. Calcutta. Soap making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. One seer is equal to 80 tolas.

2226 A.S.B., Allahabad—Process of manufacturing phenyles, etc., will appear in an early issue of Industry. You may consult The Electrician by V. L. N. Row published from this office. price Rs. 6/-.

2227 I.C.I., Panipat—Process of manufacturing lozenges and acid drops will be found in Manufacture of Confectionery published from this office, price Rs. 3/6/- including postage.

2228 M.H., Nawalapitiya—You may start candle manuftacture with Rs. 2000/- on a small scale. Candle making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. For manufacturing candles melt hard paraffin and pour into the machine fitted with wicks. Hard paraffin is used in manufacturing candles.

2229 B.T.C., Baroda—Process of manufacturing chocolate and hydrogen gas will appear in an early issue of Industry.

2230 M.G., Coimbatore—It is not possible to convert yellow celluloid to white one.

2234 S.C.W., Bangalore—Process of manufacturing soap appears in September 1948 issue of Industry. Process of manufacturing tiles and bricks will appear in an early issue of Industry. Soap making machines maty be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

2235 M.A.G., Chandpur—Buttons are not manufactured from coconut shell. We have not heard any thing about Bengal Cement fibre is unsuitable for coir making. Want to be put in touch with the dealers in coconut oil cake. Yes, Cotton Cultivation and Mills Ltd., of Calcutta have invented a special type of charka.

2237 S.K.L.S., Surat—For photo films and solutions write to Calcutta Photographic Stores and Agency Co. Ltd., 154, Dharamtala Street, Calcutta.

2240 U.S.W., Patna—Surgical dressings may be had of Bengal Chemical & Pharmaceutical Works Ltd., 164, Manicktala Main Road, Calcutta; Kesoram Cotton mills Ltd., 8, Royal Exchange Place, Calcutta and Lister Antiseptics & Dressings Co. (1928) Ltd., Uma Kanta Sen Lane, Cossipur, Calcutta.

2242 B.B., Daryabad—Lozenge making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. Sewing machine is used for making handkerchief.

2244 S.T.C., Saurashtra—You may start a soap factory with Rs. 10,000/- as initial capital. This industry has good prospect. Soap materials may be had of Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane, Calcutta. Soap making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. You may consult Manufacture of Soap published from this office, prtice Rs. 3/6/- including postage. For starting export import business you should secure Export and Import License.

2245 C.P.S., Patna—Process of manufacturing of otto will be found in Indian Perfumes, Essences and Hair Oils published from this office, price Rs. 3/6/- including postage.

2246 A.B.S., Arrah—For selling handloom products manufactured by you advertise widely.

2247 A.N., Ramnad—We do not deal in any article we only supply information and technical advice to our readers. You may start pencil factory and carbon paper manufacture with Rs. 25,000/-.

2248 K.S., Delhi—Process of manufacing tannic acid and gallic acids will appear i[illegible] early issue of Industry.

2249 K.S., Delhi—Chinese blue is use[illegible] manufacturing laundry blue.

2257 H.K.B., Ranchi—For pencils enq[illegible] of Dutta Bros., 70, Canning Street, Calcu[illegible] City Stationery Mart, 14-2, Old China B[illegible] Street, Calcutta and Imperial Stationery M[illegible] 32-E, Jackson Lane, Calcutta.

2262 B.R.J., Dehra Dun — For refi[illegible] sesamum or til oil you should treat the oil [illegible] animal charcoal and filter.

2263 S.R.S., Jullundur City—Collaps[illegible] tubes may be had of Metal Box Co. of I[illegible] Ltd., B2, Hide Road, Kidderpur, Calcutta. [illegible]lapsible tube filling machines may be ha[illegible] Industrial Machinery Co., 12, Netaji Sub[illegible] Road, Calcutta. A good formula of tooth p[illegible] will be found in July 1947 issue of Industry

2264 M.S.M., Vizianagram—To comm[illegible]cate with any querist write him with num[illegible] and initials when your letters will be duly directed. Picture frames may be had of [illegible] Art Framing Works, 90, Medows Street, F[illegible] Bombay and London Picture House, Conna[illegible] Place, New Delhi. For colour enquire Champalal Agarwala, 45, Armenian Str[illegible] Calcutta.

2265 F.C.P., Chinsura—Wants to be pu[illegible] touch with the dealers in hemp and jute ro[illegible]

2266 Y.P., Benares—For a list of books [illegible] printing enquire of Thacker Spink & Co. (1[illegible] Ltd., 3, Esplanade East, Calcutta.

2268 S.C.G., Kanpur—Recipes of u[illegible] medicines you want will appear in an e[illegible] issue of Industry.

2269 B.A.M.C., Bombay—Process of ma[illegible]facturing table vinegar will appear in an e[illegible] issue of Industry.

2270 B.U.S., Kamrup—For cast iron making machines enquire of Francis Klein & [illegible] Ltd., 1, Royal Exchange Place, Calcutta.

2273 S.K.K., Jamkhandi—For mach[illegible] and tools required for fountain pen repai[illegible] enquire of Francis Klein & Co. Ltd., 1, R[illegible] Exchange Place, Calcutta. Moulding pow[illegible] may be had of above firm.

2275 S.N.H., Dhanbad—You may con[illegible] Manures and Their Application published f[illegible] this office, price Rs. 2/6/- including post[illegible] For other books enquire of Thacker Spin[illegible] Co. (1933) Ltd., 3, Esplanade East, Calcutta

2277 K.S., Delhi—We cannot supply any special formula worked out by any ind[illegible]dual firm.

2280 I.S.I., New Delhi—A good formula of hair fixer appeared in December 1947 issue of Industry. A formula of washing soap will be found in September 1948 issue of Industry.

2281 Y.C.G., Alwar—Zinc oxide is white zinc.

2282 P.M.A., Lashkar—Following is a formula of gum paste. Potato starch 7 oz.; white dextrine 3 oz.; sodium chloride 9 oz.; zinc chloride 4 oz.; water 1 gal.; thyme oil 1 oz. Mix the starch and dextrine into uniform paste with a portion of cold water. Heat the remaining water to boiling, add salt and zinc chloride, and gradually add starch mixture. Finally add the thyme oil.

2286 S.R.B.A., Bombay—Statistics of metal top and metal toys are not available. As regards technical advice there is no such arrangement in India at present but you may try to be an apprentice in a firm manufacturing metal boxes and toys. For machineries you may enquire of Alfred Herbert (India) Ltd., 13/3. Strand Road, Calcutta.

2292 P.S.W., Purulia—A good formula of washing soap will be found in September 1948 issue of Industry. Detailed information will be found in Manufacture of Soap published from this office, price Rs. 3/6/- including postage.

2296 No name—Process of making photographic developing solution will be found in February 1948 issue of Industry.

2297 H.V., Kanauj—Formulas of cap solution will appear in an early issue of Industry.

2298 R.V.C., Ludhiana—For cardboard manufacturing machine enquire of Volkart Bros., 8, Netaji Subhas Road, Calcutta.

2300 N.L.D., Dacca—Industry is the only journal of its kind in India. We are not aware of journal publishing money making ideas and schemes.

2301 B.N.D., Nirshachati—All the ingredients you require may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta.

2303 T.B., Tanda—A formula of bottle capping compound appeared in February 1948 issue of Industry.

2305 G.N.B., Kovvur—A formula of duplicator appeared in December 1947 issue of Industry. All the ingerdients may be had of Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane and Banshidhar Dutt, 126, Khengrapatty Street; both of Calcutta.

2306 R.L.G., Bilaspur—For superior quality handloom cloths enquire of East Bengal Society, Ashutosh Bldg., 87-2, College Street; Haralalka & Co., 52-1-1, College Street; Jahar Lall Panna Lall & Co., College Street and Calcutta Friends Society Ltd., College Street, all of Calcutta.

2307 B.K.M., Khurja—You have to invest Rs. 50,000/- for starting a hosiery factory. For machines enquire of W. H. Brady & Co. Ltd., Mercantile Bldg., Lall Bazar, Calcutta. For sewing thread making machines enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. It is not possible to start a match factory producing 100 gross matches per day with Rs. 25,000/-.

2308 N.J.R., Patna—Process of manufacturing alum will appear in an early issue of Industry.

2311 M.N.S., Darrang—Cream separators may be had of Edward Keventers, 11/3, Lindsay Street, Calcutta.

2313 K.L.K., Wai—You may put your advertisement in Industry.

2314 M.T.C., Kolhapur — Eucalyptus oil may be had of Aronda Chemical Works, Bombay Chemicals may be had of Das & Co., 59, Apollo Street, P.O. Box No. 784, Bombay and Industrial Chemical Central Bank Bldg., Bunder Road, Bombay 3. Process of manufactutring all sorts of ink will be found in Manufacture of Ink published from this office, price Rs. 3/6/- including postage.

2317 B.D., Mirzapur—You may start a sawmill with Rs. 50,000/-. For machines enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

2324 L.K., Guntur—We are not aware of any such firms.

2325 T.P.S., Partabgarh—For betrolyte and salts enquire of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta.

2332 H.G.W., Calcutta—Process of manufacturing all sorts of washing and toilet soap will be found in Manufacture of Soap published from this office, price Rs. 3/6/- including postage. You should advertise in daily paper for securing a mistri who can manufacture both kinds of soap.

2334 R.S.S., Chakulia—Your query is unintelligible.

2335 M.C., Delhi—Process of manufacturing depilatory soap and powder will appear in an early issue of Industry.

2337 C.N., Jaipur—Following is a formula of hair removing powder: Barium sulphide 16 parts; zinc oxide 40 parts; starch 12 parts. Mix them thoroughly and pack air-tight.

2338 B.P.S., Muzaffarnagar—For carbon rods and zinc sheets enquire of Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta.

2340 B.T.C.W., Dinajpur—For rubber corks enquire of Bengal Waterproof Works Ltd., 32,

Theatre Road, Calcutta. Process of hydrogenation of oil will be found in Vegetable Oil Industry published from this office, price Rs. 8/6/- including postage.

2342 H.S.S., Chandausi—You have to take permission for starting a printing press and you have to make declaration before District Magistrate. Sealing of ampoules is done by putting in a spirit lamp.

2351 G.S.P., Muzaffarpur—You may use prime mover for a pug mill and oil ghanny. For patent registration you may negotiate with A. Mitra & Co., 5-2F, Raja Rajballav Street, Calcutta and Dutt & Co., 82, Harrison Road, Calcutta.

2352 P.C.G., Badanganj—Biscuit making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. This firm will supply you estimate and other information.

2355 A.S.G., Hapur—Small hand-driven laundry machine will not be very helpful for business purpose.

2356 M.R., Tadepalligudem—We have no book on coffee industry.

2359 K.K.K., Ramnagar—Agent of Parrot boot polish is Atlantis (East) Ltd., 20-1, Chetla Road Calcutta and agent of Dietz Lantern is Volkart Bros., Ballard Estate, Bombay.

2363 T.T.C., Rangoon—Formulas of cosmetics and face powder will appear in an early issue of Industry.

2370 K.M.S., Tinnevelly—Process of manufacturing indigo carmine from indigo will appear in an early issue of Industry. Yarns are twisted by means of a twisting machine then it is made into balls. For machines required enquire of W. H. Brady & Co., Ltd., Mercantile Bldg., Lall Bazar, Calcutta.

2372 R.C.C., Jaora—You may start latex product manufacture with Rs. 5,000. For chemicals enquire of Najmuddin Bros., Akber Chambers, Mohamedali Road, Bombay 3.

2374 K.C.W., Kanpur—You may start perfumery business. You may consult Indian Perfumes, Essences and Hair Oils published from this office, price Rs. 3-6 including postage.

2375 K.S., Delhi—For manufacturing ink tablets you have to use a tablet making machine which may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

2378 S.M.S.C., Dholpur—For taking agency you should negotiate direct with the firms offering your service. You should also mention your previous experience if any in this line.

2382 H.B.C., Coimbatore—Your enquiry is not in our line.

2386 A.K.D., Bombay—Oxalic acid is used by washermen for removing any form of stain from cloths. You may use bleaching powder for washing clothes but this will damage the clothes. Before soldering hydrochloric acid is used for removing oils and grease from the articles to be soldered.

2388 D.S., Saharanpur—Creosote oil may be had of Turner Morrison Co. Ltd., 6, Lyons Range, Calcutta.

2393 H.K.L.C., Hamirpur—When it is desired to varnish the surface of paper, card-work, paste board, etc., it must first be rendered non-absorbent with two or three coatings of size, which will also prevent the varnish from acting upon any colour or design which may be impressed upon the paper. The size may be made by dissolving it in glass in boiling water. The size should be applied with a clean sash tool but the touch should be light, specially for the first coating. When dry, the varnish may be applied in the usual way. Following is a formula of paper varnish: Gum dammar 16 lbs.; rosin 3 lbs.; turpentine ½ gr.; solvent naphtha 1 gal.

2394 N.H.M., Deesa—For starting a mach factory you have to invest at least Rs. 5 lakhs. You may start a soap factory with Rs. 25,000/-. As regards rope manufacture you may start with Rs. 50,000/-. Match making machines may be had of Harima Engineering Works, 63, Belgachia Road, Calcutta. Rope making machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. Soap making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. In this connection you may consult the followting book Safety Matches and Their Manufacture, price Rs. 5/- and Manufacture of Soap, price Rs. 3/-. Both the books are published from this office.

2395 N.D.W., Hubli—For sulphonated oil enquire of Calcutta Chemical Co. Ltd., 5, Bonfield Lane, Calcutta.

2396 K.K.G., Calcutta—Formulas of fountain pen ink, gum paste and curry powder will appear in an early issue of Industry.

2400 N.B.D.H., Calcutta—For distilling plant enquire of Adair Dutt & Co. Ltd., Stephen House, 4, Dalhousie Square, Calcutta.

2401 B.B.G.C., Saharanpur—For bulb slicing machine enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

Review of Books

LOCAL TAXES AND INDUSRTRIAL DEVELOPMENT. Published by Bureau of Economic Research, P.O. Box No. 45, Kanpur. Page 8, price Annas 4.

Mr. Maniam records his own impressions about the prevailing taxation system in Kanpur in his pamphlet "Local Taxes and Industrial development." The taxation system, as it exists to-day, is an impediment to an all-round development of the city of Kanpur. And there is still enough scope for reorganisation and revision of the entire taxation system. He specifically points out that all the available sources of revenue have not yet been properly tapped. He wonders that Manu Subedar makes but a casual reference to doubling of terminal taxes and does not think much of the potentialities of taxing the untaxed or increasing the low-taxed. Doubling of terminal taxes will naturally provoke strong protest from interested quarters. Before doing anything hastily, we should just make it a point to see if the existing system is in accordance with true principles of taxation. The code of terminal tax and the schedules followed by the Kanpur Municipality is a funny document with anomalies, ambiguities and vagueness. There are several items which remain unspecified and huddled in the miscellaneous group that go scot free. Over and above these unspecified and miscellaneous articles there are flagrant exemptions.

Maniam offers certain valuable suggestions to set aright all these maladjustments. He cites specific instances to show how taxes may be adjusted and harmonised so as to derive the maximum benefit for the welfare of Kanpur City as a whole and foster the industrial progress of the city. He makes a complete survey of the different industries, points out the limitations and maladjustment of taxation in specific cases and makes valuable suggestions.

This pamphlet is highly informative and illuminating. We commend it to our readers

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REPORT OF THE INDIAN TRADE DELEGATION TO THE MIDDLE EAST. Published by Manager of Publications, Civil Lines, Delhi. Pages 92.

The trade Delegation visited all the countries of the Middle East with the exception of Palestine and Cyprus. With regard to the countries visited, Syria, and Lebanon have been grouped together, as they have a customs union and for statistical purposes may be treated as a single economic unit. A chapter has been devoted to each of these countries with detailed information under the following heads:—Area and population, Weights, and measures, Currency and Exchanges, Communications, Economic resources, Industrial Development and foreign trade. An intimate acquaintance with the internal economy of these states and their needs and requirements are always indispensable to promote happy commercial relations between these countries and India. And the delegation have taken pains to tap all available sources of informations and the report may very well serve as a dependable guide to trade interests in India.

A mutual understanding and goodwill are always essential pre-requisites of a happy and cordial commercial relationship. As a matter of fact, there has been a good deal of misunderstanding in the Middle East Countries due to our Government's inability to import the usual supplies of goods. And the endeavour of this delegation has been mainly to explain the practical difficulties, India has been experiencing for all these years in meeting the demands of Middle Eastern Countries for goods such as Jute, Cotton piecegoods, Cotton yarn; Iron, Steel which are either in short supply in India itself for which World demand was much in excess of available supplies. It will be, however, most unfortunate if markets in these Middle East Countries slip out of her hand and go over to other counties. So in spite of the fact that real difficulties exist, a determined effort has to be made to export every yard of Cotton cloth which can be spared to maintain trade relations with these countries. India cannot, however, think of exporting sugar for the present for she herself is in dire need of this commodity. But so far as tea is concerned, she can encourage its expansion to this Middle East Countries and may carry on judicious propaganda. Indian Tea should henceforward be supplied not only in bulk but also in attractively packed cortons and tins. She can export machine tools, light machinery, surgical instruments as well.

Thus export should be made from all possible directions to maintain direct contact with

these countries. Special efforts have to be simultaneously made to increase Indian demand for and consumption of goods imported from the Middle East. Only a sympathetic understanding of their respective needs and requirements will ensure and perpetuate the happy commercial relations between India and Middle East Countries.

THE REWA STATE DIRECTORY. Published by K. M. Sakesena, Fort Road, Rewa Baghelkhand, Central India. Pages 256, price Rs. 5/-.

The wide publicity and diffusion of up-to-date information among the people is one of the basic and primary needs of a modern civilised government. It is sine qua non of the very existence of any modern state on the earth. Facts and figures are, so to say, the life breath of national economy. Without statistics, the country is, as it were, a ship without a compass. As the matter of fact, it is on the basis of these facts and figures that Government can formulate its economic policy. So we have reasons to be thankful to those who are pioneers in this line, because their task is a highly tremendous one, necessitating maximum amount of painstaking study, energy and initiative. Undoubtedly Saksena has rendered an inestimable service to his countrymen by publishing "Rewa State Directory," which is first of its kind in Rewa and thus furnishing his countrymen with the most up-to-date facts and figures. The purpose which it mainly seeks to serve is as Mr. Das Gupta says that of a Gazette, a guide. And it is a comprehensive source of information to businessmen, industrialists, educationists, journalists, officials and general readers alike. Only a cursory survey will give us the impression that the author has strained himself to the maximum possible extent to compile materials from scattered sources.

The book contains 15 chapters in all and is highly comprehensive embracing the various aspects namely — Geographical, Historical, Archaelogical, Political Industrial and Agricultural thus mirroring the entire economy of the state itself.

States, big and small, should henceforth cease to remain in dangerous isolation but should go forward with a creative and dynamic programme of economic development. And the most essential preliminary in this respect will be stock-taking of the potential resources of every individual state. Considered from that stand point, Rewa's State Directory renders a signal service to the state by doing the necessary spade work and thus inspiring and stimulating the creative interest of its people.

Rewa, being an agricultural country, almost 85 per cent. of the people are engaged in or dependent on agricultural pursuits. And the Agricultural Department are carrying on experiment, research work and organising propaganda to secure the adoption of new methods and improved implements. A separate section has been devoted to agriculture in Rewa which furnishes detailed information regarding Rewa's agricultural potentialities. So far as Rewa's industrial position is concerned, it is being handicapped due to lack of easy means of communication. The State has however, a busy industrial programme.

It is on this basis of correct information that people can canalise their endeavour to the most fruitful channel. Rewa's Directory will prove an indispensable guide in this respect.

NOTICES & REVIEWS

(Manufacturers sending specimens and samples of their products for notice and review may please note that no notice is published of medical preparations and allied substances in this section.)

PENHOLDERS.

We have the pleasure to receive from Mysore Supplies, Post Box No. 6, Mysore, six penholders with beautiful sceneries printed on them.

We have also received from them six packets of Chandralekha agarbatties.

BANANA FLOUR.

We are glad to receive from Padma Trading Corporation, Puthiyara, P.O. Calicut, Malabar, one tin "Padma" brand banana flour, which is found to be good.

PLASTIC SCREW CAPS.

We have received from Bombay Steel & Bakelite Industries, 59, Forbes Street, Bombay, one packet of assorted plastic screw caps in various attractive designs and colours.

PERPETUAL CALENDAR.

We have received a copy of 20th. Century Calendar from Draco's Independence Commemoration Industries, (DICI), Bangalore 3. This useful calendar is worth keeping by everyone for ready reference. Its price is Re. 1/-.

TEA NEWS & VIEWS.

We have the pleasure to receive a copy of Tea News & Views No. 8, of the series 1947-48 campaign issued by the Commissioner for India, Indian Tea Market Expansion Board, 101, Netaji Subhas Road, Calcutta. The issue under notice describes the stimulating effect of tea produced on the nerves of hard-working people.

TRADE ENQUIRIES

(To communicate with any party write to him direct with name and address given below mentioning Industry).

2075 M. Balakrishnan, 78, Kaman Mettu Lane, Andar Street, Teppakulam, Trichinopoly —Wants to be put in touch with the suppliers of pure tiger fat, peacock fat and fat of a bat.

2116 A. K. Pillai, 125, 41st Street, Rangoon —Wants to be put in touch with the suppliers of bidi leaves in India.

2299 S. A. Wahab, Khilos, Kathiawar—Wants to be put in touch with the suppliers or manufacturers of hand-made thread buttons.

2333 M. M. M. Meyappa Chettiar, Thanichavoorani, Devakottai Post, Ramnad—Wants to be put in touch with the suppliers of second-hand laundry machine.

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THIRTY NINTH YEAR OF PUBLICATION

EDITED BY K.M.BANERJEE

THE MAGAZINE FOR MANUFACTURERS & BUSINESSMEN

XXXIX. CALCUTTA, NOVEMBER, 1948. N

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A Monthly Magazine for Manufacturers and Businessmen.

Published in the first week of the month by
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EDITORIAL CONTENTS FOR NOVEMBER, 1948.

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Last day of accepting advertisement is the 10th day of the previous month. Any order for alteration or correction of copy is not entertained after that day.

Advertisement rates for ordinary and special position, both casual or contractual, are sent on request.

CORRESPONDENCE.

All enquiries regarding industrial or business information should be addressed to the Editor. Contributions and articles for review and notice should also be sent to him.

All enquiries regarding the Subscription or Advertisement Departments should be addressed to the General Manager.

OFFICE HOURS.

Editorial Department 11 A.M. to 4 P.M. on weekdays and 11 A.M. to 2 P.M. on Saturdays.

Subscription and Advertisement Department 10 A.M. to 5 P.M. on weekdays and 10 A.M. to 1 P.M. on Saturdays.

Classified Bargains

ADVERTISEMENTS under this head of small announcements cost 4 As. per word, minimum Rs. 3 payable by Postage Stamp or M.O. with order. No vouchers given.
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LIST OF CLASSIFICATIONS.

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For "Asian" Water Transfer Pictures. (Bengali Name:—JL-Chobi) of all national Leaders, God, Fruits, Flowers, Birds & Animals etc. Rs. 5/- for 3 books in a box. Sample 1/12/- for 1 Book. Free Delivery. Apply with advance. Mukherji & Sons P. O. Chandernagore Dist. Hooghly. 1203 AA

Wanted agents on lucrative terms for Dadrudalan (Ringworms, Eczema etc.) (Sonit Suddhi) (Blood Purifier) Lice-foe, (Lice killer) Safety Razor (Hair Remover). Sample against -/8/-. D. K. Ash & Co., Sutragarh, Santipur P.O. (Nadia) West Bengal. 1165 AA

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Wanted Agents and Stockists for our famous Golden Eagle and Snowfine Boot Polishes. All kinds and Shades. Very attractive terms. Uppal Chemical Works, (India) Karol Bagh, Delhi. 580 AA

Wanted District and Travelling agents and stockists for Fountain pens, Silk Hosiery, and fancy goods on liberal commission. D. R. Puri & Son, 6/30, Western Extension, Karol Bagh, New Delhi. 439 AA

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Wanted Agents to Sell Our Fancy Silk Saris. Vamaco Industries. Juhi, Cawnpore. 945 AA

Wanted Agents for Horn and Pearl Buttons. Lily Button Factory, Katherpool, Dacca. 529 AA

Wanted agents for Alight Torch Battery. Dey Roy & Co., 13, David Josef Lane, off Canning St., Calcutta. 217 AA

For Leather & Asbestos Hand-gloves, Perpetual Calendars, Diary covers, Handbags, Purses, etc. Apply Bengal Leather Industries, 10/C, St. James Square, Calcutta. 902 AA

Wanted Agents & Merchants for our famous Buttons throughout India & abroad. Eastern Small Industries, Dacca. 960 AA

Venus Dye—Soap (Ready dyer) Experienced Agents wanted every where, Dico, 227/2, Maniktala Main Road, Calcutta—11. 1063 AA

Wanted Agents for Alight Battery. Oriental Traders, 13, David Josef Lane, off Canning St., Calcutta. 817 AA

Cycle Tubes Punctures, Insured Against Rs. 2/- Agents Wanted:—Suntex Company Chitladarwaza, Delhi. 814 AA

Wanted Agents for Pearl & Horn Buttons samples Rs., 4/-. Basanti Button Mfg. Co., Farashganj, Dacca. 967 AA

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Wanted Agents to Canvas for 1949 Calendars attractive pattern having novelty. Write to Empire Calendar Mfg. Co. P. Box No. 6734, Calcutta. 1108 AA

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Wanted Agents and Stockists for our Horn and Pearl Buttons. Dacca Office. J. Smith & Co., Dacca (Bengal). Our Calcutta Office:—32/S, Banamali Chatterjee Street, Calcutta 2. 1085 AA

Wanted Agents pay Rs. 200/- allowance daily Rs. 5/- and on commission for foreign goods, Lalit Import Service, Sadarbazar, Delhi. 847 AA

"Wanted Agents, Wholesalers, Stockists to push "Bosco's" perfumery products." Apply Bosco Chemical Works, 18/1, Sahitya Parishad Street, Calcutta—6. 1103 AA

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Leaving September for South Africa would like contact business personals in view of taking agencies with him, Bankers are Imperial Bank of India Bombay. Please Send Agency terms samples and particulars to Dr. C. I. Jamal. P. O. Vankaner (Kathiawar). 1167 AG

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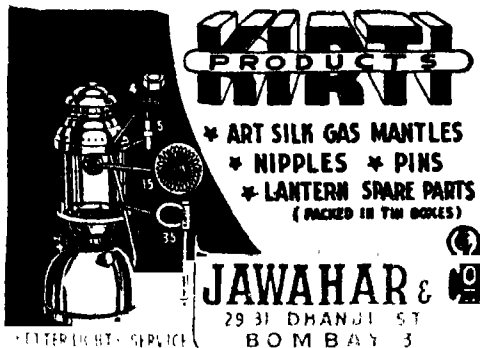
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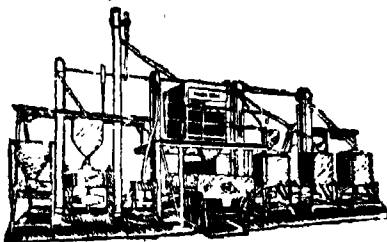
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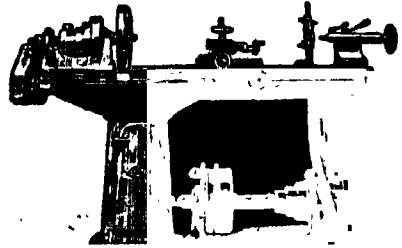
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Industry

EDITOR:
N. BANERJEE.

VOL. XXXIX. CALCUTTA, NOVEMBER, 1948. No. 464.

SCOPE OF COTTAGE INDUSTRY IN THE NEW SET-UP.

THE formidable obstacles for speedy and quick industrialisation mainly lie in the difficulties of foreign exchange to obtain capital equipment and the time lag between the placing of an order and the delivery of goods.

When these practical difficulties exist in the way of speedy large-scale industrialisation and drive for increased production remains all the more urgent, Government will have to tap and exploit all other alternative sources of production in the interim period. We firmly believe that reorganisation of existing cottage industries along sound lines is the best alternative open to the Government and seems quite a practicable proposition in the present context of economic crisis. Cottage industries, we know, require less capital goods and are capable of yielding quick substantial results. India has a large and an almost unlimited labour supply while her resources of capital goods are strictly limited. Under these circumstances, the supply of human labour may be fruitfully harnessed to suitable schemes of cottage industries. Besides, we strongly feel that there should be a prompt and ready absorption of the vast number of refugees in productive investments. This will, we hope, partially solve the refugee problem, and make them useful and worthy citizens of Indian Dominion and at the same time promote the happiness and prosperity of India as a whole.

While our Government contemplate revival of cottage industries in the rural areas, they will have to keep in mind the main flaws and drawbacks that are still prevailing in cottage-industry organisation and hampering the progress of the industry as a whole. The drawbacks mainly relate to (a) financing, (b) supply of raw materials, (c) marketing and publicity, and (d) productive technique.

We hope, Government will give anxious consideration to these specific problems and create suitable conditions for the favourable growth and development of these industries. Government may also seek Japan's aid with regard to organisation and productive technique where linked system of small industries has reached a very high standard of success and efficiency.

Current Topics

INDIAN LEATHER INDUSTRY.

The panel on leather and leather goods have made a thorough examination of the main drawbacks of Indian leather industry. And they are of opinion that unless the defects are remedied in the quickest possible time, there is scarcely any hope of progress. The defects mainly consists in inferior breeds of live stock, negligent flaying, defective curing. They can be easily remedied and the principal remedial measures suggested by the panel are as follows:—(*i*) Provision of suitable instruments for flaying purposes, (*ii*) and research on warbles and sticks. But this is not all. Deficiency in scientific knowledge and lack of necessary tanning materials have, so long, hampered the smooth and steady progress of leather products because it is mainly these factors which account for bad tanning. So large scale cultivation of wattle bark and research with a view to manufacture synthetic tannin should, in the opinion of the panel, be immediately undertaken. Two types of technologists, according to the panel, will be necessary for this purpose. They are leather chemists and ordinary tanners, the chemists fit for higher technical jobs and the latter to take charge of the different departments in a tannery.

As regards leather goods, the panel fixes the target at 45 million pairs of shoes and this can be achieved by mechanisation of industry. India depend for most of her requirements of civilian and industrial leather goods like hand bags, purses photo frames, albums, machine belting, picking bands, buffers and tuggers for loom on imports. But we should see how we can attain self-sufficiency in respect of these commodities.

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH AND THEIR ACHIEVEMENTS.

Governing body of the Council of Scientific and Industrial Research has approved the proposal for the establishment of a central Road Research Institute at a capital cost of Rs. 7.5 lakhs. The activity of the proposed research institute will cover a very wide field dealing at one with the construction and improvement of village roads and at the other with materials available easily and construction of roads and highways. For the development of one integrated and compact national economy, Roads and highways play no unimportant part. These roads and highways will go a long way to co-relate and co-ordinate the economies of thousands of Indian villages which so long remain in dangerous isolation. So problems, relating to rural road will always receive the utmost priority. Tentative plans for a central Building Research Station have also been accepted by the council and a grant of Rs. 5 lakhs was recommended for putting into operation the first stage of the plant. A planted building and housing scheme should be undertaken in the interest of national health and hygiene. The present housing system particularly in Bustee areas is most insanitary and unhygienic. Present congestion in cities like Calcutta. and Bombay is producing most ruinous effects on public health and hygiene. So any move in this direction is highly welcome and desirable. Problems connected with the construction and housing programme of the Central Government and Provincial Government will engage the foremost attention of the building Research Station.

The Central Building Station and the Central Road Research Station will be just two engineering research organisations in the chain of National Laboratories under the auspices of the Council of Scientific and Industrial Research.

NEW FUNCTIONS OF TARIFF BOARD.

Tariff Board was set up in 1945, to enquire into claims for protection by various industries. The original function of the Board was merely to examine the claims and recommend. But recent developments clearly indicate that the Board are gradually expanding their scope and jurisdiction. They have frequently undertaken enquiries into prices of commodities. The Board have recently completed its enquiry into cloth prices. And will shortly complete their enquiry into prices of paper. The Government, too are increasingly feeling the need of an institution which may furnish them with the latest facts and figures because it is only on the basis of these up-to-date facts and figures that a correct formulation of economic policies is practicable. Government have, therefore, alloted certain vital additional functions. These functions are (i) to enquire, as and when required by the government into the cost of production of commodity, produced in the country and to determine its wholesale, retail and other prices and to report on the same (ii) to recommend to the Government as and when required, measures necessary for the protection of India's industry from dumping from abroad (iii) to undertake studies, as and when necessary on the effects of advolrem and specific duties and tariff valuations on various articles and the effects of tariff concessions granted to other industries and to undertake studies on the effects of trusts, monopolies and other restraints on trade, which may tend to affect industries enjoying protection by restricting production or maintaining or raising price and to devise ways and means of preventing such prices.

The Tariff Board is also authorised to keep continuous watch over the progress of protected industries and conduct enquiries into the effects of duties. Enlargement of the functions of Tariff Board is highly desirable because of ever-increasing problems in the sphere of trade, industry and commerce.

THE INDUSTRIAL FINANCE CORPORATION.

The newly floated Industrial Finance Corporation of India is likely to grant the first instalment of financial aid before the end of this month. This organisation has been instituted to heighten the tempo of industrial and economic activities all throughout the country. The preliminaries are proceeding in quick pace, and it is hoped that the corporation would be in a position to commence its operations earlier than one might have anticipated. The preliminaries consist in detailed examination of applications for assistance received through questionnaires, collection of information regarding the technical, organisation financial and economic aspects of every project; and in the appointment of necessary ad-hoc committees.

This corporation however, refuses to confine its functions and operations to sanction of mere financial aid only. They will extend their jurisdiction upto the limit of providing the best possible technical and managerial advice to prospective industrial organisations and other organisations as well. With this end in view the I.F.C.I. would include in its staff, as its activities develop, teams of experts in industrial organisation, costing, engineering and the like. This is, undoubtedly, a creative idea and will yield substantial and tangible benefit.

to the industrial progress of our country in as much as it will enable the corporation to subject the industrial projects seeking financial aid from it an expert scrutiny and greatly facilitate starting of new enterprises.

The corporation, will furthermore keep themselves abreast of current trends in the sphere of industry, and will encourage those industries, in particular, which are strategically vital and important. For that purpose, the corporation will make it a point to maintain constant touch with the Government of India.

The corporation have been authorised to finance only the private enterprises, without becoming a partner in them. As such it cannot finance state undertakings.

We earnestly hope that this finance corporation will serve the very useful purpose of fostering industries which are at a very low ebb.

IRRIGATION AND POWER PROJECTS.

The Government of India have undertaken a programme for development of irrigation and power projects. Both are vital and essential needs of our country. And no delay should be made in the speedy execution of these development plans.

We have strong reasons to believe that these irrigation and power projects will, after their completion, yield very substantial and tangible benefit and contribute to the economic well-being of the country as a whole. It is estimated that speedy implementation of this programme will add over 27 million acres of irrigated land to the country's existing 48 million acres and about nine million k.w. of hydro electric energy to the existing half millions.

These facts have been amply elucidiated in a leaflet entitled "New projects for irrigation and power" in India. It is stated in this leaflet that approximately 6 p.c. of the total waters available in our rivers and in the sub-soils has so far been utilised. The rest generally runs to waste and in its progress to sea creates havoc destroying life and property of millions.

Quick materialisation of these vital projects will, we hope, put an end to this recurring tragedies at the same time ensuring the utilisation of the total water power potential which must be in the neighbourhood of 40 million k.w. mark.

Irrigation and cheap electricity will usher in a new era of happiness and prosperity amongst millions of our poor countrymen.

INDIAN ALUMINIUM INDUSTRY.

The projected aluminium industry scheme in the Central Provinces and Berar, with certain readjustments in the scheme and with technical man power and machinery would be the largest aluminium producing project not only in India but in the World. India can supply any quantity of bauxite for the produce and the industry, we believe, has a very bright future.

According to the present scheme, the factory will have a production capacity of 5000, tons a year and now the capital is Rs. 3.75 crores. The Provincial governments have invested 1.5 crores in this project. Mr. T. C. Ghosh, Director-General of Industry, originally doubted the economic soundness of the scheme and thought it essential to carefully examine the financial and economic aspect of every project before the government could commend it to the public. His final impression however, is that production of aluminium in the Central Provinces and Berar would be economical and the cost of production would not be

higher than the landing prices quoted by importers. When the Waingana river project for generating hydro-electric power to the extent of 6,00,000 k.w. would materialise, the Director-General hoped that it would be possible to manufacture at a much cheaper rate that within a period of ten years the plant capacity would be raised gradually to 50,000 tons a year and at competitive rates.

INSTITUTION OF RUBBER INDUSTRY.

The Indian Section of the Institution of Rubber Industry (London) was inaugurated on 4th September by Mr. R. F. Bennettee. The institution which was formed in 1921 aims at bringing together manufacturers, growers, suppliers of raw materials, scientists, connected with the production and use of rubber so that various units might freely exchange views on different aspects of industry and thus ensure its ordered growth for the benefit of all concerned.

In his address Mr. Bennettee says, "The institution is a most important and valuable organisation and during the past twenty-seven years has largely contributed towards the development of rubber science and technology. Unlike most other rubber manufacturing countries, India produces about 80 per cent. of its rubber requirements the production aggregating 16,000 tons of raw rubber. The major portion of this quantity is absorbed by tyre manufacturers.

The industry in India, Mr. Bennettee reveals, now consists of some 100 units. scattered throughout the length and breadth of India, including the Indian states, some 15 of which are reported to be first grade plants. The potentialities for the development in India, he pointed out, are very great.

KANDLA TO BE A MAJOR PORT.

Indian dominion is without a major port along 1000 miles coastline between Bombay and Karachi to serve the vast hinterland. So Government of India have done the right thing in setting its seal of approval on the Committee's recommendations regarding Kandla.

Kandla of to-day, a small port of minor importance will, before-long, bloom into a major port, thereby making up the loss of an important port namely Karachi. The Government of India have decided to develop this port into a first-class major port after a close scrutiny of the recommendations, forwarded to it by the "West-coast major port development committee."

The selection of Kandla has been the right and proper thing considering its latent potentialities and future possibilities. This port, situated at the Eastern end of the gulf of Cutch, constitutes a natural sheltered harbour and is easily navigable. The geographical position of Kandla, says the committee's report, is best suited to replace the port of Karachi in its services to its hinterland.

It is encouraging to find that Government of India are speeding up the necessary preliminaries to implement this decision. These measures include in addition to the freezing of land values, the appointment of a resident harbour engineer, the development of both broad and metre gauge connections and a reference to an ad-hoc Committee of engineers to advise on such further steps as may be necessary to ensure sufficient supply.

The Government of India, we think, have done the right choice in having decided on Kandla. The enormous congestion in Bombay Docks in recent days, adds force to the argument that Kandla port should be developed post-haste.

FURTHER LIBERALISATION OF IMPORT POLICY.

The Government of India have decided to remove control forthwith over the import of yet more categories of goods from sterling soft and medium currency countries by allowing them in under open general license from countries in Central North and South America and the Philipine Islands, but excluding (a) Brazil, Chile and Uruguay (b) Bizonia (in Germany). Belgium of Belgian Colonies, Portugal and Portugese colonies (excluding Portugese possessions in India and Japan) (c) Union of South Africa.

The items included in the general licenses are (1) Electric insulators, Shackle etc. Woollen carpets, floor rings etc. Jute Manufactures and carriage of carts not mechanically propelled, parts thereof excluding rubber tyres and tubes, complete cycles, picking bands, dry distemper, fine pieces of locks.

A notification issued by the Ministry of Commerce says that importation can be made without license of certa specified articles from all soft country are and from Sweden and Switzerland (condition that the goods are shipped fro these two countries on or befo January, 31.

This recent decision, taken by the Go ernment of India is a step in the rig direction at present. There are no tw opinions about the matter that the restri tive policy so far adopted in respect import, should be completely liberalised.

Our latest foreign trade accounts sho a trend towards a favourable balanc additional imports may now be finance out of current earnings. And they nee not mean a depletion of our existir sterling or dollar exchange reserve Moreover, it should be borne in mind th under inflationary conditions, a net exce of exports may itself be an inflationa influence.

GALVANISING IRON

GALVANISING is the process of coating the clean iron surface with a thin layer of zinc in order to prevent it from rusting. This coating may be done by four different methods:—

(a) Dipping in molten zinc (hot galvanising).
(b) Electrolytic precipitation of zinc (Electro-galvanising).
(c) Diffusing metallic zinc at a temperature which is slightly below its melting point (sherardizing).
(d) Spraying zinc by compressed air (spraying process).

The zinc coating produced by the above four methods differ fundamentally from one another in respect of structure and thickness. Hot galvanising is the most important and most widely practised method from a very long time while the other three methods are employed according to special circumstances and hence we shall discuss at present about the former in his article leaving the other three which may be taken up at a later date.

PICKLING.

The first step in this process is pickling the sheet iron with sulphuric or hydrochloric acid in order to remove the surface coating of scale by dissolving the scale itself or "peeling" it by dissolving the iron base upon which it has grown. The pickling tanks are very large and made of thick (3"—8") wood e.g., larch, pitch pine etc., lined inside with sheet lead, tar or asphalt. These wooden tanks are now being gradually replaced by concrete and certain types of synthetic resin tanks.

The pickling rate is influenced by the temperature and concentration of the acid. In case of sulphuric acid the speed increases with the rise in temperature of the pickling bath while in case of hydrochloric acid concentration of the acid is the predominating factor. The sulphuric acid bath is made by adding 1 part by volume of 60°Be. Glover acid to about 26 parts by volume of water so that the specific gravity of the freshly prepared bath is 1.062. The temperature is maintained between 60°—80°C. by steam coils. The hydrochloric acid bath is made by adding 1 part by volume of 21°—22°Be. acid to twice its volume of water so as to record the specific gravity of the fresh bath to 1.045. The temperature is kept between 30°—40°C.

During the pickling process the hydrogen gas evolved diffuses through the iron ware causing what is known as "pickling blisters", if any oxidic slag is enclosed within, and decreases the cohesion and tensile strength of it. To pre-prevent this hydrogen damage and unnecessary consumption of acid, various substances are added to the bath. Tar, fat, glue, sour beer, etc. were used in the old process but now they are replaced by such chemicals as diazole, diazene, mercaptane etc. in the amount of ½ gr. to 1 gr. per litre of the bath solution. Moreover, pickling machines are also employed to remove the accumulation of hydrogen by mechanical means.

The sheets to be pickled are put on pickling baskets made of wood, Durrion, monelmetal, duraloy, nichrome, etc. Various types of pickling machines are employed to move the pickling sheets in the acid bath or to produce a current of the bath-solution keeping the pickling sheets stationary. After 30-35 pickling charges, the bath solution acquires a high iron content and hence it is run off and replaced by a fresh solution. The consumption of acid is generally 4-7 per cent. according to the thickness of the sheet iron.

WASHING AND STORING.

After the pickling process is over, a black coating often remains on the surface of the sheet which amounts to about 0.5 per cent. or 0.3 per cent. of the weight of the pickled sheet according as sulphuric or hydrochloric acid is used in the bath.

The pickling sheet after its removal from the pickling bath is covered with the bath solution, which on exposure to air, deposits a layer of iron salt. In order to remove it the pickling sheet is transferred to a washing tank where it is washed in a continuous current of fresh pure hot water.

The sheet is then conveyed to the storage tank where it is immersed in water to exclude the air. Here it is "aged" for 15-24 hours when it gives up the hydrogen gas absorbed during the pickling process. Here a slight rusting occurs which is removed immediately before introduction in the molten zinc bath by washing in 1-2 per cent. hydrochloric acid solution.

FLUX.

The primary condition for a satisfactory galvanisation is that metallically pure iron should enter metallically pure zinc. A flux is necessary to effect such condition by dissolving or removing the contaminations still remaining on the surface of the sheet so that clear and dry surface enters the molten zinc bath. Ammonium chloride and zinc chlorides are used for this purpose. Ammonium chloride when added to molten zinc reacts with it and produces a powerful fluxing agent named zinc-ammonium-chloride. The reaction surface between the flux and molten zinc must not be unnecessarily large. Care must be taken to prevent undue heating of the flux which may thereby decompose and loose its effectiveness. 2-3 per cent. glycerine is usually added to prevent the rapid consumption of the flux. If any large amount of organic matter is associated with the flux, then a charring may occur at the fluxing temperature causing a deposition of carbon specks and consequently damaging the sheet.

ZINC-BATH.

The kettle for melting zinc is rectangular or of any other design, the size and shape being determined by the weight of iron to be galvanised per hour and its shape. Too large volume of molten zinc is uneconomical. So the dimension is so chosen that the heat content of the bath is able to stand against too drastic fall in temperature due to the introduction of the cold sheet. The kettle is made of "siemens-marin" sheet iron 20-40 mm. thick according to the size, rivetted together, or better soldered together by watergas or by autogenous soldering. Cast steel kettles may be used in special cases. The kettle is usually placed at the floor level upon a fire brick construction and heated by coke, gas or electricity.

Zinc which is melted in the kettle is used in the form in which it comes from smelters. Old zinc roofing, sheet zinc articles etc. may also be used after removing the oxide film and iron content by melting them in a separate pan. The temperature of the zinc bath is never allowed to rise above 500°C otherwise a serious damage of the kettle may occur reducing its life due to the solvent action of zinc upon iron.

The presence of iron to the extent of 0.2 per cent in the zinc bath is very objectionable and hence it must be removed. A very small amount of lead may be allowed as thin coatings are obtained from a bath having low lead content. Cadmium is added to the bath upto 0.1 per cent. to make the bath more fluid and to produce a lustrous coating. But ex-

cessive amount will cause the coating to peel off when the sheet is subjected to bending operation. The superficial appearance and uniformity of the coating is improved by the addition of a small amount of tin in the bath. 0.2-0.3 per cent. of aluminium is added to produce a more durable white lusture and a very flexible coating. It also decreases the zinc absorption to a great extent. Antimony causes very large zinc flowers but it is discarded as it makes the coating rather brittle.

THE GALVANISING PROCESS.

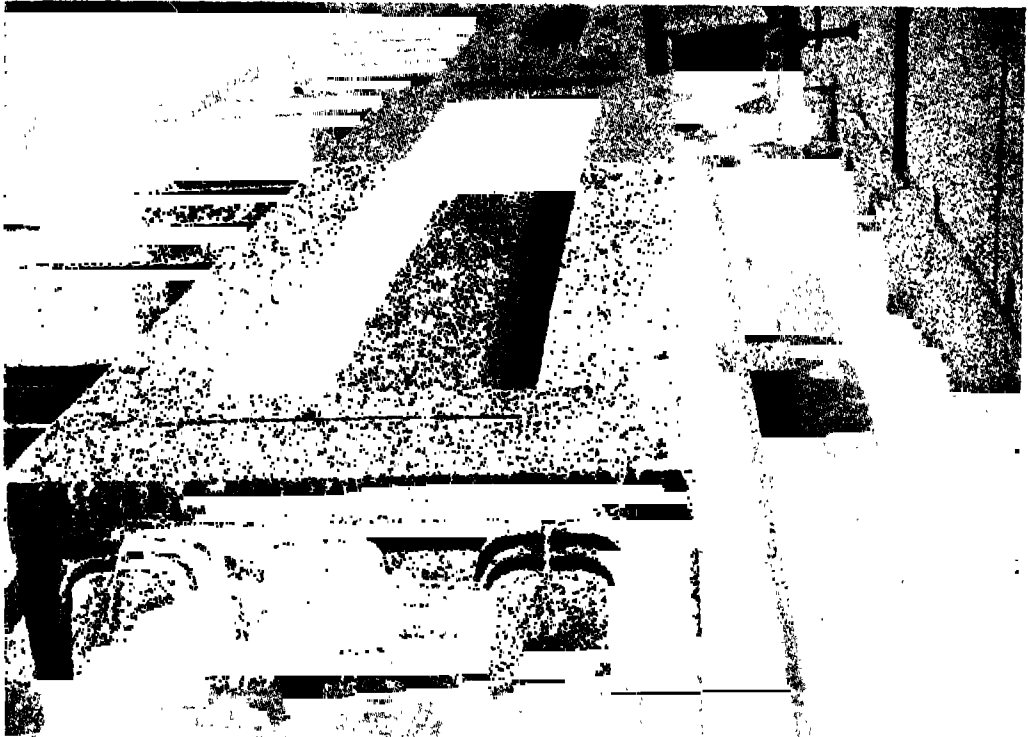
In the oldest process the surface of the molten zinc bath is divided into two parts by means of a suspended sheet iron partition one part of which is covered a few centimetres thick with ammonium chloride flux leaving other part exposed. The sheet to be galvanised is lifted out of the storage tank by tongs and after draining the water is lowered into the zinc bath through the flux layer and pushed aside below the surface of the bath. The exposed surface is skinned off the oxide layer and the sheet is taken out of the bath by special tongs.

The disadvantages of this simple method are:—

(1) Larger number of workers required for a smaller output.

(2) Greater percentage of zinc lost as oxide and hard dross.

(3) Longer period of immersion in the bath resulting a thicker coating on the sheet.

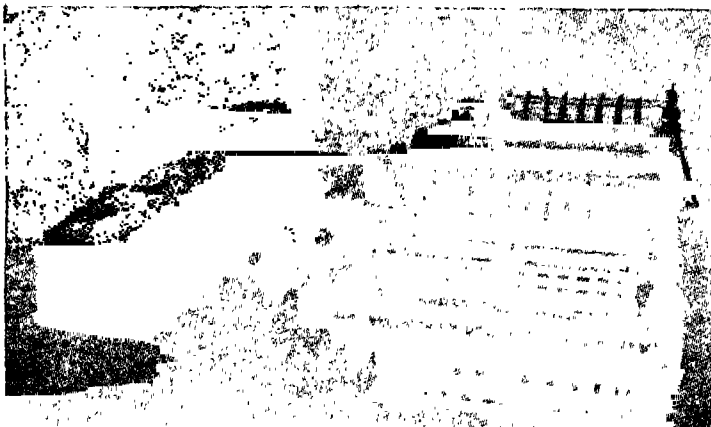
(4) Lesser uniformity of the coating thickness due to irregular way of lifting the sheet out of the bath.

A Modern Galvanising Tank Heated by Producer Gas.

The duration of the immersion period in zinc bath may be considerably shortened (and consequently a thinner coating may be obtained) by using a lead bath in the above process the exposed surface of which is covered with a thin layer of molten zinc.

But even then the other drawbacks are not removed for which various kinds of machines have come into vogue. The main features of these machines are that the wet sheet from the storage tank is first passed through a set of rubber covered rollers which remove excess of water from the sheet. A pair of intake rollers then introdices the sheet in the bath and another pair immersed in the bath itself passes the sheet through the bath to the discharge rollers the sheet being guided all along its passage through the bath by a guide-cage construction. The rate of introduction and withdrawal is very uniform and the period of dipping is very short and hence, a thin but uniform coating is effected. The sheet then passes through a plate trueing machine for removing any distortion of the sheet which it may have undergone during the galvanisation process. It may also pass through a corrugating machine for giving a corrugating effect if desired. The sheet then finally passes through a polishing machine for improving the superficial appearance before it is packed..

DRY GALVANISING PROCESS.

Zinc coating which will not crack or peel off during the rivetting or bending operation of the galvanised sheet is produced by what is termed as "Dry galvanising process." An outline of which is given below:—

The sheet is picked by cold concentrated hydrochloric acid and washed and stored in hot water in the manner already described. Immediately before galvanisation the sheet passes through a hot bath of saturated zinc chloride solution and dried in furnace. The hot and dry sheet is then introduced in the zinc bath containing about 0.2 per cent Al. and withdrawn at a comparatively slow but steady rate. in an inclined position. Too quick withdrawal will result in uneven coating of zinc layer over the sheet. The bath is replenished with regular addition of aluminium in quantities 1 per cent. much larger than the actual aluminium content of the bath in order to make up the loss due to its excessive affinity for oxidation. No covering of flux layer can

A Modern Galvanising Machine.

be used over this type of bath as in that case aluminium chloride will from as a result of the chemical action with ammonium chloride and due to the volatile character of aluminium chloride, all aluminium will soon evaporate out of the bath. Low rate of production and high cost of galvanisation are its chief defects.

GALVANISATION OF PIPES.

The general method of galvanisation of pipes is the same. The galvanising kettle is modified for this purpose and is made rather narrow but deep vessel having a lead bath superficially divided by a partition through its entire length. In one of the partitioned portion is the thin covering of molten zinc while in the other is the flux layer of a few cms. thick. The pipe introduced in the bath float on the surface of the lead making it easier to lift out. After its withdrawal from the bath compressed air is blown through the pipe till zinc solidifies for keeping the bore even. The pipe is then subjected to rapid cooling in soft water in order to produce a better appearance after which they are threaded and tapped.

GALVANISATION OF WIRE.

Greater difficulties are encountered in galvanising wires. In order to correspond the special requirements of wire galvanisation, the kettle is usually long but not too deep and the temp. of the zinc bath is higher than usual (460°-47°C). It is a continuous process where by several wires (6-30) from the reels pass at the rate of 6-30 meters per minute according to the size, through the pickling bath, watering tank, dil. warm solution of zinc chloride and over a heated plate before it is led through the molten zinc. The coated wires then pass through a spray of water and finally passed through a draw plate to impart a superficial polishing.

GALVANISATION OF CAST IRON.

The galvanisation of cast iron also presents some difficulties as we have no metallically pure surface in this case due to silicon and graphite inclusions. An outline of the general process is as follows:—

The object is pickled in hydrofluoric acid the strength of which is varied according to the thickness of sand coating etc. It is then subjected to scouring with about 1 per cent. hydrochloric acid sol. and treated with conc. zinc chloride solution followed by a brief washing with water. From the zinc chloride solution they are transferred to the zinc bath through a sal ammoniac flux. They remain in this zinc bath until they have assumed a coating of zinc. For this purpose they may be left hanging in the zinc bath for some time, whereby they are lifted out at short intervals. However in order to facilitate the binding of the zinc, the zinc bath is to be kept at a higher temperature than usual.

MAIL ORDER ADVERTISING.

MAIL order advertising appeals, as a rule, to those who have only an average education, and consequently it should be simple and direct.

Mail order copy amounts essentially to a simple, complete, and enthusiastic description of an article, together with an illustration and the prices. In most mail order advertising it will also be found that very explicit and detailed information is given on the way to send money. There is only one way in which mail order adveritising can be effectively prepared and that is by letting the person who prepares the advertising become acquainted with the people that buy by reading their letters. In this way he soon learns their state of intelligence and determine just what words to use in describing an article.

MANUFACTURE OF TOILET SOAPS BY COLD PROCESS.

TOILET Soaps demand the greatest attention from the manufacturers. Besides possessing delicate colour, they should have compact appearance and delightful scent.

The starting point in toilet soap manufacture is to make the soap according to the cold or the hot process and then to incorporate suitable colours and perfumes.

Ordinarily toilet soaps are made by three processes, viz., by cold process, by remelting, and by milling. At present we propose to deal with the cold process, as it is simple and easy and can be carried cut with less costly machineries.

FATS AND OILS.

By cold saponification, that process is understood in which the exact quantity of lye necessary for a neutral soap is stirred into melted coconut oil or palm oil, and is chiefly used for the production of cheap toilet goods. It depends upon property which coconut oils possess of combining with high degree caustic soda solution at a low temperature; self-heating in the frame ensues, the resulting product being a white solid soap, which yields an abundant lather. The saponification of coconut oil in this way takes place so readily that other fats and oils which do not so easily saponify can be treated by this process. Use is made of this circumstance, and a certain percentage of tallow, grease, olive oil or castor oil, is generally used in soaps of this kind. Coconut oil saponified by itself yields the purest and whitest soaps, and consequently the finest coloured goods, but it is best in all cases to employ one or other of the above-mentioned fats or oils with it, as they tend to produce a softer and more durable soap. Such soaps especially those with a considerable addition of tallow, approach more in appearance and also in use to milled or curd toilet soaps, from which when well and carefully made, they frequently cannot be distinguished by the uninitiated except by the fracture, this, in the case of cold made soaps, being amorphous, but in curd soaps it is always crystalline.

Whether tallow or other fats and oils are used or not the method of preparing cold process soaps is always the same; there are only slight differences with regard to the temperature of the fat and the quantity of the lye necessary for saponification. In respect to these two points it must always be remembered that coconut oil requires a larger amount of lye for its complete saponification than the other fats and oils used with it. After it comes tallow, grease, and olive oil, which all require about the same amount of lye castor oil requires the least.

With coconut oil alone, as well as with admixtures of grease, castor oil and olive oil, the temperature in summer is not raised above 28°C, sometimes less; in winter, on the other hand, 33°C is the limit. For admixture of tallow the above-mentioned temperatures may be raised somewhat in winter, but it is never necessary to go above 45°C.

TROUBLES IN MAKING SOAP BY COLD PROCESS.

All the troubles frequently occurring in cold saponification, such as thickening, lumping, seediness, and partly also the grey colour of the soaps, originate in the more or less large amounts of free fatty acids in the oils. These difficulties can be partly prevented by conducting the saponification at as low a temperature as possible, which can be done at 23°Cto 25°C. The mass on the addition of the lye, may appear to partially solidify, so that cold crumbs form; then when the lye increases

the heat of the soap these crumbs re-dissolve, the soap again becomes smooth and gradually thinner, and can now as usual be stirred to the normal thickness. Soaps treated in this manner exhibit great delicacy and a fine white colour, but require vigorous and uninterrupted stirring. If this treatment does not prevent the soap becoming thick and granular, or a white and durable soap is specially desired, recourse must be had to the above-mentioned refining process with stronger lye.

As previously intimated, admixtures of tallow, lard, castor oil, and olive oil are recommended for better qualities of soaps. The two first-mentioned fats are specially suitable, as they render the soaps milder and at the same time do not make them any inferior in hardness and handle. They can be added to the extent of 50 per cent. without interfering with the saponification process; only the proportion of lye must necessarily be reduced somewhat as these two fats do not need so much lye as coconut oil alone.

STRENGTH OF LYE REQUIRED.

The lye for soaps made by the cold process is best prepared from 76 to 77 degree caustic soda. By dissolving 100 kilos of caustic soda in 200 kilos of water a caustic lye of about 40°Be is obtained. The lye is stored in tightly closed reservoirs until required for use and generally utilised at 38°Be. If 73 or 75 degree caustic soda is used, the lye must be made up to 40°Be on account of the smaller amount of caustic soda present. Half a kilo of caustic soda of 38°Be or 40°Be is reckoned for the saponification of 1 kilo of coconut oil. Such mixtures give very solid soaps; if soaps with a softer handle is wanted, 1 to 2 kilos of distilled water are added per 30 kilos of lye shortly before use; in some instances in the place of an equivalent quantity of caustic soda lye a few kilograms of caustic potash lye are used.

PLANT FOR SOAPS MADE BY COLD PROCESS.

The vessels used in the manufacture of soaps made by the cold process are as simple as the process itself. A light kettle is required rather deeper than it is broad, preferably with a rounded bottom and made of strong sheet iron or zinc. A stirrer of hard white wood or a small iron crutcher with a wooden handle is also necessary. The frames to receive the soap are either of iron or wood, lined with tin-plate, and should hold from 50 to 100 kilos of soap.

It is advisable to have a small iron tank provided with a brass stopcock to hold the necessary quantity of lye; the stream of lye running into the fat can be regulated by stop-cock, so that only one person is required to make the soap.

PROCESS OF MANUFACTURE.

Before proceeding to describe the manufacturing process it may be as well to mention that the fats used must be as pure and fresh as possible, also good quality caustic lyes are absolutely necessary. Further, the lye and fat must be accurately weighed out, as an excess of lye in the soap makes it very hard, harsh and biting; if too little lye is used, on the other hand, the fat would not be completely saponified and the soap would be greasy and soon acquire a rancid colour.

When melting up the coconut oil the larger part of the oil is heated to 50°C; the source of heat is then removed or the fat transferred to the stirring kettle, when the remainder of the fat is added, so that finally the temperature stands at 37° to 38°C. Higher temperatures in melting should be avoided or else the oil may become discoloured.

The very simple process of making soaps in the cold way is carried out as follows: The requisite quantity of oil is weighed out, and after passing through a fine linen cloth or hair sieve to remove any impurities, it is run into stirring kettle. It is brought to a temperature of 27° to 33°C and then the accurately weight quantity of the lye of 38° to 40°Be is run into it in a thin stream with constant stirring. Frequently half the quantity of lye is first added to the oil at the proper temperature, in a thin stream, with constant stirring; then if combination takes place and the mass becomes white the rest of the lye is added. The whole is then well stirred up until combination takes place, which is indicated by the mass becoming thick, and appearing perfectly uniform and translucent, also a sample taken out by the paddle should run off rather pasty and draw out into threads. If fresh Cochin coconut oil has been used for the soap this point will probably be reached after several hours' stirring, but when using Ceylon coconut oil and additions of tallow, lard, etc., considerably earlier. When the soap exhibits these characteristics the perfume is uniformly stirred in and the mass poured into the france, which is tin-lined or covered with fine linen cloth, and especially well covered by a wooden lid or with cloths, so that it gets hot. After some hours the temperature rises to about 80°C owing to saponification, a thorough combination of oil and lye taking place. The process is assisted by the frames being well covered up. It may also here be pointed out that, in order to prevent the soap from cracking superficially when heating commences, it should be covered over with a damp cloth directly after framing. The filled frames, which must not be too high and must not be filled too full, should be placed in a room having a temperature of from 15° to 20°C.

SUPER-FATTED SOAPS.

For some years fine toilet soaps prepared in the cold way from coconut oil with a large percentage of tallow, have been considerably improved by the addition of 5 to 10 per cent. of lanoline, whereby they become superfatted, and in order to make them more brilliant and more curd like toilet soaps, about 3 to 5 per cent. of ceresine or Japan wax has also been added. The toilet soaps super-fatted with lanoline are not only soft and mild, but exercise a very pleasant and agreeable effect upon the skin in use, and above all have a specially glossy appearance when stamped, which can be still further improved by polishing with the dry hand.

The method of manufacturing super-fatted toilet soaps in the cold way is the same as that of coconut oil soaps just described; only the lanoline is melted up in the fat heated to about 50°C and then the lye stirred in when the temperature is about 32°C. The lanoline can, however, also be melted separately and stirred into the warm oil of about 35°C. If, however, ceresine or Japan wax is used for the soap, it is added, either alone or melted up with some of the tallow, to the fats heated to about 45° or 48°C and then the lye is run in at such a temperature in the usual way. Should the ceresine or Japan wax, once in the oil, partially solidify and begin to separate out on account of too low a temperature, the whole of the fat must be warmed up again until the ceresine redissolves.

PERFUMING.

In perfuming toilet soaps the selection of essential oils are absolutely necessary to obtain good results. In case of white soaps, cassia oil and oil of cloves are of no use, as they impart a yellowish tint to them. Oil of vetivert and patchouli oil are noted for their permanent odours, and also fix the odour of other oils mixed with

hem. On this account these oils are very often used in small quantities for various oilet soap perfumes. Ambergris, civet, nd musk also possess this property, es-ecially the last, which enters into the ompositions of most perfumes, imparting o them very considerable durability.

Regarding the quantity of perfume to e used, it may be stated that 4 to 8 grams re required for every kilo of soap, ac-ording to the intensity of the perfume.

CUTTING AND STAMPING.

After the soap has remained in the rame about a day it is taken out, and fter standing some 8 days longer it is cut p. In cutting care must be taken to cut s little to waste as possible. The soap ut into bars, the height and breadth of the ars corresponding to the ultimate size of e cake, is laid up to dry for a short time; en the edges are trimmed off and it is cut nto suitable pieces, from which the edges re likewise removed. The resulting ieces of soap are placed on trays without uching each other, dried for some time, d then finally stamped.

SOME TYPICAL RECIPES.

Below is given a few typical recipes r the benefit of readers.

BROWN.

Coconut oil	50	kilos.
Caustic soda lye 38°Be	25	,,
Brilliant brown	20	grams.
Cassia oil	225	,,
Oil of cloves	110	,,
Balsam Peru	115	,,

YELLOW.

Coconut oil	50	kilos.
Caustic soda lye 38°Be	25	,,
Uranine yellow	14	grams.
Boiling Water to dissolve the dye	600	,,
Cassia oil	150	,,
Oil of caraway	100	,,
Lavender oil	105	,,

WHITE.

Coconut oil	50	kilos.
Caustic soda lye 38°Be	25	,,
Caustic potash lye 16°Be	2	,,
Ginger grass oil	110	grams.
Caraway oil	80	,,
Lavender oil	80	,,
Thyme oil	80	,,

BOUQUET.

Coconut oil	25	kilos.
Tallow	25	,,
Caustic Soda lye 37°Be	25	,,
Leaf green, water soluble	16	grams.
Oil of lemons	100	,,
Lavender	80	,,
Peppermint oil	80	,,
Sage oil	80	,,
Rosemary oil	60	,,
Thyme oil	40	,,

ROSE.

Coconut oil	46	kilos.
Tallow	4	,,
Lanoline	3	,,
Caustic Soda lye 37°Be	25	,,
Cardinal red	16	grams.
Lavender oil	165	,,
Lemon grass oil	132	,,
Citronella oil	67	,,

FLORA.

Coconut oil	25	kilos.
Tallow	25	,,
Caustic soda lye 37°Be	25	,,
Caustic potash lye 16°Be	2	grams.
Leaf green	8	,,
Lavender oil	165	,,
Cassia oil	165	,,
Geranium oil	55	,,
Uranine yellow	3	,,
Tinct. musk	15	,,

GLYCERINE.

Coconut oil	25	kilos.
Tallow	12½	,,

(Cotinued on page 320)

NEEDLE MAKING

THE needle making was without doubt one of the first arts practised by man, and dates back to the remote period when man first evidenced a desire to cover his body with clothing.

In its original shape the needle was in appearance like the modern shoemakers' awl, which was used for merely perforating materials meant to be fastened together along their edges, so that they could be laced together by hand. As the use of the needle involved two operations it was soon discarded for a needle with a circular depression near blunt end for holding the thread, and thus did away with the lacing operation. Since this needle, though it did well enough for coarse work, was inadequate for finer work, the needle with the eye was introduced.

Since the introduction of steel needle the model has remained the same, and progress in the art of needle-making has been confined to devices for perfecting the material used and the methods of construction. In the early days of needle manufacture, when the trade was practised at home or in small shops, the materials and devices used were very crude. After the manufacture of the needle was started in plants provided with conveniences and facilities for its production, improvements were slowly introduced in performing the different operations.

Needle is generally made of steel wire of 0.85 to 1.1 per cent. carbon content depending on the class of goods for which it is required. The various gauges of wire are cut to the lengths required, each wire being the length of two needles. They are received from steel mills in 7,14, or 28 lbs. bundles. A typical bundle of packet for the production of size 8 sharp's needles or the ordinary housewife's needle weighs 14 lbs. and contains 72,000 wire, 0.024 inch diameter and 2-7/8 inches long, or sufficient to produce 144,000 needles 1-7/16 inches long.

Before machining operation beings the wires are placed in rings of suitable size, heated to an annealing temperature and rubbed with a flat face bar. This serves to straighten each wire by removing the slight curve left by the cutting machines.

(Continued from page 319).

Olive oil	12½	kilos.
Caustic soda lye 38°Be	25	„
Uranine yellow	12	grams.
Lemon grass oil	160	„
Cassia oil	200	„
Lavender oil	40	„

CROWN.

Coconut oil	50	kilos.
Caustic soda lye 38°Be	25	„
Water	1½	„
Brilliant rose	16	grams.
Palmarosa oil	150	„
Lavender oil	150	„
Citronella oil	150	„

ALMOND.

Coconut oil	48	kilos.
Castor oil	2	„
Caustic soda lye 38°Be	25	kilos.
Glycerine	½	kilo.
Art. oil of bitter almonds	250	grams
Lavender oil	50	„

MUSK.

Coconut oil	25	kilos.
Tallow	22	„
Crude palm oil	3	„
Caustic soda lye 37°Be	25	„
Orange peel, pulverised	2	„
Cinnabar	200	grams
Bergamot oil	200	„
Lavender oil	200	„
Cassia oil	50	„
Oil of cloves	50	„
Artificial musk	3	„

leaving the wires perfectly soft and straight. In this form, the wires are known as "stiffs."

The "stiffs" now pass to the first abrasive operation, pointing. The points are formed in a grinding machine of a standard type generally employed in wire pointing operations and extensively used by the makers of talking machine needles and the numerous varieties of steel points used in the textile industries. Formerly the wires were fed to the grinding wheels by hand, the operator sitting right over the stone. In those days, a pointer's life was a short one, due to the steel dust and abrasive dust which he inhaled as well as casualties due to bursting stones. To-day the operation is entirely freed from danger by efficient dust removal system and the care taken by the manufacturer of abrasive wheels to test them thoroughly and to state the speeds at which they should be run. The grinding machines are fitted with efficient guards.

The wheels generally used are concave faced manufactured for the purpose. The face has a radius of 3 to 7 inches, according to requirements and wheels vary from 16 to 24 inches in diameter and from 8 to 4 inches face. The operation of pointing is semi-automatic, the wires being fed in a continuous stream across the face of the wheels and the operator only being required to prevent "jams" or crosses."

A small wheel, or roll, faced with rubber meets the wires at right angles to the axis of the grinding wheel and in the concave face, carries the wires across, revolving each wire against a rubber-faced stationary saddle. Due to the axis of the roll being set slightly out of the right angle the wires first are ground at the extreme point. This operation "sets" the wire while the second stage grinds the long taper required. After one end of each wire has been ground, they are turned round and put through the machine again. Thus each wire is pointed on both ends.

The wheels require frequent dressing and considerable skill is required in setting up the machine. It has been found economical to have a skilled pointer to every machine except for the larger sizes of fish hook wires, knitting needles and crochet hooks. To keep the stiffs apart from each other and make them roll freely in passing through this machine and in later process they are frequently dusted with lycopodium powder.

The mixture of abrasive and steel dust removed from the dust collecting plant is in great demand for the construction of garden paths as when damp it settles into a solid form which appears indestructible.

The next operation which is also an abrasive one is termed "skimming" and consists of cleaning the oxide and scale from the surface of the steel about the middle of each wire. It is effected by passing the wires over a rapidly running emery band, the wires being traversed across the hand by two revolving discus running on the same axis as the band but at a greatly reduced speed. The wires are revolved by passing along a fixed rubber-covered saddle.

The wires are now termed "points" and pass on to the "making" process. The production of the eye of the needle is effected in two operations by an ingenuous tool. The first operation impresses the form of the two eyes on each point. or wire and the second one punches out the blanks from the centre of the eye impressions. The machine is automatic and produces about 7,000 complete blanks or 14,000 needles per hour. The chief feature of the machine is the arrangement by which the needles are delivered to the tools in the exact position

necessary for impressing the blank and punching out the eye by means of an air blast and air suction. After the wires are stamped and eyed, they are broken into single needles by hand.

The needles, as they are, pass to the next abrasive operation which removes the waste metal or "splash" thrown up around the sides of the eye by the stamping of impressing process. The same machine at a different setting, shapes the head above the eye. The needles are fed into grooves on the flanges of a wheel. The wheel revolves on to a tightly stretched rubber hand which holds the needles in place and revolves them individually as they pass across the concave face of a small abrasive wheel about 3 inches in diameter.

The needles are now heat-treated and it is on the hardening and tempering processes that a large part of the reputation for quality is enjoyed by needles of foreign make. Great care is exercised to produce absolute uniformity and the latest types of furnaces and pyrometrie methods are employed. Much waste can be made at these processes by lack of a little care or attention. It is interesting to note that the needles are not brought to the final temper in the tempering process. it being left to the polishing operation and the heat developed there to produce the temper for which the needles are justly famous.

After heat-treatment, the needles undergo the scouring or polishing process which is the last abrasive operation. The present method of polishing needles has come down almost unchanged for 200 years and while frankly admitted to be clumsy and uneconomical, it has not been found possible either to substitute another system or improve the present one to give the quality of finish required; together with a sufficiently low percentages of waste. In passing it is of interest to note that it has been found through much experiment that no rustproofing proces, such as various method or plating, are nearly so proof against rust and corrosive as a well scoured and finished needle by the old-fashioned method. The method of scouring is as follows. The needles are mixed with an abrasive consisting of emery powder, soft soap and water, they are tied up in bundles with canvas and cord, each bundle containing a packet of needles and resembling a large sausage

The scouring machines consist of heavy runners which are oscillated backward and forward over a solid table faced with steel. The needle packs are placed between the moving runner and the table and roll continuously for about a week. It is estimated that during this time, they travel a distance of some thirty miles. From time to time during the process, water has to be added to prevent the package running "dry," which would cause the needles to rust. Also the canvas and cord have to be renewed. The pressure or load on the runners is varied according to the size of the needles being polished. It is here that heat is generated which produces the final temper. After having the scouring machines, the needles are thoroughly washed and dried in hot sawdust, the separation of the needles from the dust being carried out by a process probably derived from the old manner of winnowing grain.

The needle is now a finished article, but still it has to go through sorting, grading for length, and examination process. Every needle is individually examined by skilled "viewers" for every one of the numerous defects to which it is liable. The speed and dexterity of the observers is wonderful. After the viewing process, the needles are stored until actually required for delivery to the customer, when they are counted out and packed into the various forms of paper

and wrapper with which we are all familiar.

The abrasive operations in the manufacture of fish hooks, knitting needles and crochet hooks are not essentially different the pointing of the highest grade of fish hooks however. not being a grinding process at all but being done by hand workers with a file.

APPLICATION OF HONEY IN CANNING & PRESERVING.

THE word honey has come down through ages as an emblem of sweetness, flavour, goodness, and health. Its very name attached to a food or preserves carries an appeal to the public. It has an advertising value recognised by bakers and candy and preserves makers alike. Honey cakes, honey bread, honey candies honey preserves appear on the market under various trade names and the purveyors of these foods freely admit that the magic name honey alone helps to sell the product. There is nothing like a good name and in this respect honey among foods has a distinction quite unique.

In canning and preserving honey may be used in place of all or a part of the sugar required. The milder flavoured honeys are probably most compatible with the less tart fruits for making sauces and jellies. The stronger flavoured honeys, particularly those with a spicy flavour, are excellent for pickling purposes and conserves made from tart fruits like gooseberries and rhubarb.

It is somewhat difficult to designate special honeys for special fruits as taste preferences vary. The maker can best determine his own requirement by experimenting some. All honeys are good but not all flavours of honey are equally as pleasing to all individuals.

An all-honey syrup is naturally darker than a sugar syrup. Such a syrup tends to darken the lighter coloured fruits as peaches and pears, when canned for sauce However, the original fruit flavour is intensified. If one prefers a lesser degree of the original flavour of the fruit, it is better to replace only from one-fourth to one-half of the sugar ordinarily used with the honey.

In using honey, two precautions should be observed:—

(a) Since honey has a tendency to foam considerably when heated, there is some danger of the product cooking over at the beginning of the cooking period if a large enough preserving kettle is not used or the syrup carefully watched.

(b) Since honey is part water, it is necessary to cook the product in which it is used slightly longer in order to obtain the desired consistency.

HONEY IN SAUCES.

First make syrup. For this purpose bring water to boiling point. Add the honey and stir. Again let come to a good rolling boil. Remove all scum.

To can the fruits adopt cold pack method as stated below. Pour the boiling syrup over the fruit which has been packed in sterilized jars. Now process according to standard schedule.

To can fruits by hot pack method proceed as follows:—

Add fruit to boiling syrup (directions given above). Allow to come to a good rolling boil. Fill in sterilized jars. Process according to standard schedule. The following proportions for the various fruit sauces are preferred.

Be sure to remove all scum from the syrup before pouring over fruit in jars or adding the fruit if the hot pack method is used.

JAMS AND JELLIES.

Apple, plum, quince and currant jellies can be successfully made by using ¾

cup honey to 1 cup of juice or half honey and half sugar may be used.

In preparing jellies with all honey boil the juice 10 minutes. Add honey and cook to 220°F. Remove scum. Pour in hot sterilised glasses, cover with paraffin.

If a mixture of honey and sugar is used instead of all honey, boil the juice for 10 minutes. Add sugar and bring to boiling point. Add honey and cook to 220°F Remove scum. Pour in hot glasses and cover with paraffin.

HONEY JELLY.

Honey	2½ Cups.
Water	½ Cup.
Fruit pectin (liquid)	½ bottle.

Mix honey and water in preserving kettle. Bring to full boil as quickly as possible. Add liquid pectin, stirring constantly. Bring to full rolling boil. Remove from fire at once and skim. Quickly pour into hot glasses. Cover with paraffin.

Note:—1 pint=2 cups=1½ pound.

STRAWBERRY JELLY.

Ripe berries	1½ quarts.
Honey	4 cups.
Juice	2 cups.
Liquid pectin	½ bottle.

Crush the ripe berries. Squeeze out juice. Drip through cotton flannel for sparkling product. Measure 4 cups honey and 3 cups juice into preserving kettle. Stir, bring to boil. Add the pectin, stirring constantly. Bring again to full rolling boil and allow to boil for 20 seconds. Remove from fire, let stand one minute, skim. Pour quickly into hot glasses. Cover at once with paraffin.

CHERRY JELLY.

Cherry juice	2 quarts.
Honey	1 quart.

Crush cherries. Cook slowly without water till tender. Drip through cotton flannel. Measure 1 quart of honey to 2 quarts of juice. Boil until it double drops from the spoon. Remove scum, pour into hot glasses. Cover with paraffin.

PEACH JAM.

Peaches	3 Lbs.
Honey	2 Cups.
Allspice	¾ teaspoon.
Cloves (whole)	1½ teaspoons.
Cinnamon (bkn.)	3 "
Lemon juice	3 tablespoons.
Peach juice	¾ Cup.

Put spices in cheese cloth sack. Cook slowly all ingredients until of desired consistency. Remove bag of spices. Place in sterilized jars and cover with paraffin.

The following typical recipes will be helpful in preparing honey preserves:—

SUNSHINE PRESERVES.

Add 1 lb. of honey for every pound of fresh fruit. Mix and spread on platters. Place platters in box slightly higher at back than front. Cover with glass. Place in sunshine on a bench. When preserves are thick, put in sterilized jars and seal

APPLE PRESSURE.

Apples, crushed	2 quarts.
Cinnamon, ground	½ teaspoon.
Allspice	1 pinch.
Honey	1 pint.
Lemon juice	1 tablespoon.
Vinegar	1 pint.

Cook slowly for several hours. Stir frequently to prevent sticking and scorching. When thick, can in sterilized jars Cover with paraffin and seal.

GINGER PEARS.

Wash, pare, core and cut into very thin slices hard underripe pears. Allow 4 lbs. honey to 4 lbs. pear slices. Add ½ cup water, 1 oz. ginger root cut into small pieces, 2 lemons using the rind (cut in very thin strips). Simmer all ingredients very slowly. When thick as marmalade seal in hot sterilized jars.

PINEAPPLE WATERMELON PRESERVES.

Honey	1 lb.
Water	¾ Cup.

Salt	1 teaspoon.
Lemon juice	1 lemon.
Rind of	½ lemon.
Ginger	½ teaspoon.
Watermelon rind, cut small	1 lb.

Smear all together gently for 3 hours. Add 1 cup crushed pineapple. Cook 1 hour longer. Seal in sterilized jars.

ORANGE MARMALADE.

Take 2 medium size oranges, 2 cups honey, 1 cup water, 6 tablespoons lemon juice, ¼ cup liquid fruit pectin. Run oranges through food chopper. Add water, simmer 15 minutes after it has come to good boil. Add honey, bring to a boil, then simmer 30 minutes. Add lemon juice. Add liquid pectin. Bring to full rolling boil and allow to boil 30 seconds. Remove from fire, skim by turns for about 5 minutes. This slight cooling should prevent floating fruit. Pour quickly in sterilized glasses. Cover with paraffin at once.

PICKLES.

APPLE, PEACH, AND PEAR PICKLES.

Honey	3 Cups.
Vinegar	3 „
Water	2 „
Salt	1 teaspoon.

Bring these ingredients to a boil. Add fruit and cook till tender. Pack in sterilized jars and seal. For apples tie the spices in clean cloth sack and boil in pickling syrup. For pears and peaches stick the whole cloves in the fruit and allow stick cinnamon to cook in the pickling syrup. Spices consist of cloves and cinnamon. Two to three whole cloves to each pear or peach depending upon size of the fruit.

CUCUMBER PICKLES.

Cucumbers	2 quarts.
Ginger	¼ teaspoon.
Vinegar	4 Cups.
Cinnamon	¼ teaspoon.
Allspice	⅛ „
Honey	2 Cups.
Celery seed	1 teaspoon.

Mix spices, vinegar and honey.] come to a boil. Pour over cucumbers a seal.

CAULIFLOWER PICKLES.

Remove outside leaves and stal then wash cauliflower thoroughly. Bre into small flowerets. Cook in boili salted water for 12 minutes. Rinse cold water. Pack pieces in hot sterili jars. Fill the jars with honey spic vinegar prepared as follows:—1 qu vinegar, ½ cup honey, 1 stick cinnam 1 teaspoon celery seed, 2 small onic sliced, 1 teaspoon whole cloves, 1 te spoon allspice. Boil this mixture 15 to minutes. Strain and it is ready for pou ing over cauliflower. Seal while hot.

CHUTNEY SAUCE.

2 onions, 1 green pepper, ½ cut l red pepper, 3 green tomatoes, 2 tart a ples, 1 cup raisins, 3 cups crushed pir apple, ½ cup vinegar, ½ teaspoon ging 2 tablespoons salt, 2 tablespoons musta powder, pinch of red pepper, 1 cup hon juice of 1 lemon. Run through fo chopper the first six ingredients. Add t other ingredients and simmer slowly f 2½ hours. Pack in jar and seal.

MANUFACTURE OF MOSQUITO REPELLANT CREAM.

MOSQUITO repellant cream is emulsified neutral soap containi some free stearic acid, pyrethrum extra a stabilizer to check bacterial activity a citronella oil to mask the odour of t hydrocarbon extract of pyrethrum.

MATERIALS.

Oil arachis (Groundnut oil), sodiu hydroxide, sodium silicate, tragacant

pyrethrum extract, citronella oil, stearic acid, salicylic acid. All the raw materials are easily available in India.

EQUIPMENT.

A boiler. A steam heated soap pan with alternate cooling arrangement by water circulation. Common laboratory accessories including a constant temp. oven for carrying out accelerated tests.

FORMULAS.

Two representative formulate are given.

	"A" With 20% pyrethrum extracts.	"B" With 40% pyrethrum extracts.
Oil arachis	10.00	5.00
Sodium hydroxide	0.50	0.50
Sodium silicate (sp. gr. 1.35)	7.00	7.00
Tragacanth	0.50	0.50
Pyrethrum Extract	16.00	8.00
Citronella Oil	4.00	4.00
Stearic Acid	18.00	15.00
Salicylic Acid	0.25	0.25
Water	43.75	59.75
	100.00	100.00

The ingredients of the formulae are all by weight in the finished product.

PROCEDURE.

Preheat arachis oil to 100°C and introduce into it alkali solution, made from one part alkali and two parts water. After allowing time for saponification add hot sodium silicate solution made from one part silicate and three parts boiling water with continuous stirring. After stirring for about half an hour, add the requisite quantity of water (hot 90°—95°C) after allowing for the water taken from the solution of tragacanth. Simultaneously add the prescribed quantity of water hot stearic acid with continuous stirring, avoiding formation of lumps. Close the steam inlet and open the circulatory cooling system.

When the temperature comes down to 62°C add citronella oil and pyrethrum extract simultaneously with tragacanth solution. Add the stabilizer (salicylic acid) and stir on.

Transfer to a shallow dish when the temperature of the cream is about 45°C. Stir on till the cream has cooled down to room temperature and allow to set well before filling in. Up to fifteen per cent. of the requisite quantity of water has to be added in the beginning to allow for the loss due to evaporation in the course of manufacture, if the process is carried out in an open pan, depending on the size and shape of the pans.

The prepared cream should conform to the specification given below:—

1. When shaken for two hours in a mechanical shaker, in a ½ lb tin, filled three-fourths at room temperature (about 32°C) there should be no separation into water and oil.
2. When placed in an oven at 50°C for four hours in a half lb. tin, the cream should not crack. If it melts partially it should reset on cooling to room temperature. No cracking of the cream should take place on shaking for two hours immediately after taking it out from the oven.

3. The water content of the product should not exceed 50% in the case of "A" and 66% in the case of "B" formula.

The above has been reproduced from a note supplied by "Council of Scientific and Industrial Research".

Pharmaceutical Recipes

DYSENTRY CURE.

Castor oil	1	oz.
Gum acacia	3	dr.
Sugar	3	"
Caraway water	4	oz.

Add one ounce of the water to the gum. Then add oil gradually and stir. Then add the water.

For adults: 15 drops to 1 dram.

DIGESTIVE POWDER.

Chebulic myrobalans	1	oz.
Embelic myrobalans	1	"
Ajowan	1	"
Aniseed	1	"
Ginger, dried (south)	1	"
Rock Salt	1	"
Caraway	1	"
Common Salt	1	"

Reduce to powder separately and mix.
Dose: 1 to 2 teaspoonfuls after food.

LIQUID EXTRACT OF KALMEGH.

Kalmegh	500	grams.
Oil of fennel	2	millilitres.
Oil of ajowan	2	"

Alcohol (90 per cent) a sufficient quantity.

Boil the Kalmegh with 1500 millilitres of water for half an hour and strain. Add further 1500 millilitres of water, boil for half an hour strain. Repeat the process until a total of 2000 millilitres of the extract are collected. Mix and concentrate to 250 millilitres on the water bath. Dissolve the oil of ajowan and oil of fennel in 200 millilitres of alcohol (90 per cent) and add this alcoholic solution to the concentrated extract.

Dose:—8 to 15 minims.

SYRUP GLYCEROPHOSPHATE.

Calcium glycerophosphate	200	gr.
Potassium glycerophosphate	100	"
Sodium glycerophosphate	100	"
Magnesium	100	"
Iron glycerophosphate acid (20 per cent)	200	drops.
Caffeine	50	gr.
Strychnine	2	"
Sugar	8	"
Glycerine	4	oz.
Tincture of cudbear	300	drops.
Chloroform	120	"
Alcohol	40	"
Distilled water to make	20	oz.

Triturate the glycerophosphates, with the glycerine previously mixed with 4 oz. of water. Dissolve the caffeine and strychnine in the glycerophosphoric acid, using gentle heat if necessary and add to the first solution. In this dissolve the sugar without heat and add the other ingredients. Filter through twill calico using talc, if necessary.

STAINLESS IODINE OINTMENT.

Iodine	1	oz.
Oleic acid	4	"
Soft paraffin	14	"
Hard paraffin	1	"

Dissolve the iodine in the oleic acid and mix intimately with the paraffin.

ECZEMA OINTMENT.

Boric acid	80	gram.
Carbolic acid	1	"
Flowers of sulphur	60	"
Camphor	60	"
Ichthyol	60	"
Starch	1	oz.
Zinc ointment	1½	"

Triturate all the ingredients in a mortar until thoroughly incorporated.

CORN SOLVE.

Salicylic acid	6	dr.
Methyl salicylate	2	"
Wool fat	2	"
Yellow wax	2	"
Lard (benzoated)	11	"

Mix all the ingredients thoroughly in a mortar.

CHAULMUGRA OINTMENT.

Chaulmugra oil	10	parts by weight.
Hard paraffin	40	"
Soft white paraffin	50	"

Melt the hard paraffin over a slow fire and incorporate the other two ingredients. This ointment is very efficacious in leprosy, lupus, eczema, etc.

SODIUM BICARBONATE LOZENGES.

Sodium bicarbonate	100	grms.
Powdered sugar	890	"
Tragacanth gum	10	"
Water	80	"

Make a mass with the ingredients and cut in cubes of 1 grm. each.

CASCARA LAXATIVE SYRUP.

Fluid extract of cascara	4	fl. oz.
Syrup of senna	6	"
Syrup of orange	4	"
Fluid extract of malt to produce	1	pint.

Dose: one to two teaspoonfuls.

PILES OINTMENT.

Tannic acid	40	gr.
Morphine	4	"
Oleic acid	80	"
Lanolin	120	"
Soft paraffin to make	1	oz.

Mix.

Recipes for Small Manufacturers

DRY CLEANING FLUID.

Glycol	2 fl. oz.
Carbon tetrachloride	60 „
Naphtha	20 „
Benzine	18 „

This is an excellent cleaner that will not injure the finest fabrics.

SOLIDIFIED METHYLATED SPIRIT.

Stearic acid, double pressed	315 grams.
Carbonate of soda	35 „
Methylated spirit	16 fl. oz.

Melt the stearic acid, add the soda dissolving in a small amount of water. When saponified add the methylated spirit. Stir until about to set. Pour in tin pots and put up the lid and keep aside.

GRAFTING WAX FOR TREES.

Japan wax	1 part.
Beeswax	2 parts.
Rosin	8 „
Oil of turpentine	1 part.
Hard paraffin	1 „
Suet	3 parts.
Pine resin	6 „

Melt the waxes along with resin and while hot add the hard paraffin to it; then stir in the turpentine oil and pine resin and pour the mixture in a stone slab.

DOG SOAP.

Linseed oil	18 parts.
Caustic potash	4 „
Water	6½ „
Rectified spirit	q.s.
Cresol	1½ parts.

Dissolve the caustic potash in water. Next warm the linseed oil on a waterbath and slowly stir in the caustic potash solution. When the saponification is complete, add water if required. Then add a small quantity of spirit and cover the mass with a cup. Continue heating until the soap becomes transparent. Finally mix the cresol and set aside to cool.

COMPOSITION CORK.

Shellac	12 parts.
Oil of turpentine	14 „
Chalk powder	7 „
Rosin	12 „
Lampblack	2 „
Bone black	2 „
Asphaltum	2 „

Melt the shellac, asphaltum and resin in a large copper vessel; then pour the turpentine cautiously into it so that it may not catch fire. Afterwards add the remaining ingredients and incorporate thoroughly.

LIQUID GLUE.

Gelatin	1 lb.
Water	8 oz.

Allow to stand together in a 4-lb. gallipot until the glue is soft; then put the pot in a saucepan of water, and heat until the glue dissolves. Next add

Nitric acid	6 dr.

Stir until effervescence ceases, set aside for 12 hours, and decant.

POLISHING PASTE FOR ALUMINIUM ARTICLES.

Precipitated silica	8 oz.
Kerosene	4 „
Oleic acid	2 „
Stearic acid	2 „
Lard	1 „
Talc powder	1 „

Melt together the oily ingredients and stir in the others until a smooth paste results.

CHUTNEY.

Gur	1 seer.
Green ginger	1 „
Garlic	1 „
Raisins stoned	½ part.
Chillies	4 chs.
Mustard seed	½ seer.
Vinegar	q.s.

Boil the gur to a syrup in one seer of vinegar. Pound the other ingredients and mix them together with the syrup in the other 4 seers of vinegar. Put it into a large jar and keep it out in the sun for a fortnight.

SOLID BRILLIANTINE.

Spermaceti	500 parts.
Castor oil	500 „
Benzoated lard	200 „
Rose oil	1 part.
Rose geranium oil	4 parts.
Petitgrain oil	5 „

Melt the spermaceti and lard over water bath. Then remove from the source of heat and add the castor oil and then the essential oils. Mix and pour in pots.

LIQUID DEPILATORY.

Sodium sulphide	14 parts.
Glycerine	20 „
Water	160 „
Rectified spirit	4 „
Perfume	1 part.

Dissolve the sulphide in some of the water: add the glycerine and mix. Add the remainder of the water and finally the perfume, dissolved in the alcohol, mix well and filter. The strength of this depilatory can be increased by increasing the amount of sodium sulphide but in no case should it exceed 10 per cent.

In the Field of Invention

[I]MPROVED GLAZING PROCESS.

A new improved pottery glazing has [b]een announced by the British Ceramic Re[se]arch Association.

The process consists of a system of de[fl]eloping glaze with bentonite in the proportion [o]f one to four per cent. This ensures in the [fi]rst place, a considerable reduction in glazing [v]ariations which often spoil the appearance of [th]e ware, besides increasing the cost. Second[ly], a substantially reduced overall amount of [g]laze is taken up with as good results as ordi[n]ary glaze.

Experiments carried out on factory scale [h]ave shown that the total amount of glaze [u]sed could be reduced by from 20 to 30 per [c]ent. without having any deleterious effect on [th]e ware. The treatment also enables ware of [v]arying properties all to be dipped in the same [g]laze without previous sorting. Consequently [t]he costs are reduced and production is speed[e]d up.

—INDIAN AND EASTERN ENGINEER.

[N]ON-INFLAMMABLE LUBRICATING OIL.

A new non-inflammable lubricant, with [c]ountless commercial possibilities, has been [p]erfected by scientists of Birmingham Univer[s]ity after six years' secret research.

The compounds so produced will enable [c]ars to be run for a lifetime on one filling of [l]ubricant. Moreover these will eliminate the [r]isk of fire in, all oil-burning engines, reduce [t]he risk of fire in cars, ships, and planes; and [e]nable manufacturers to make non-inflammable [f]abrics.

The basic principle is the substitution of [f]luorine for hydrogen in hydro carbons. This [s]ubstance has now immense potentialities as a [s]afe lubricant in aviation and motoring. With [m]odifications it can be used in plastics, lac[q]uers and in the linings of chemical apparatus. The simple effect of this discovery is that it [i]s now possible on a commercial scale damp[p]roof oils and lubricants.

[N]EW ORGANIC WEED-KILLERS.

Two New Weed-Killing Chemicals, sodium [i]sopropyl xanthate and allyl chlorophenyl car[b]onate have been produced by the Goodrich Che[m]ical Co. The products are reported to have been widely tested by the Federal and State Agricultural Experimental Stations in America and found to give excellent results against many weeds and grasses not economically controlled by weed-killers now on the market. Sodium isopropyl xanthate is toxic to all vegetation and cannot be applied directly to growing plants. Allyl chlorophenyl carbonate is a selective weed-killer, particularly useful against blue grass, cattails, and similar grass type weeds.

RUST PREVENTION IN WATER-HEATERS.

"Cathodic Protection" provides an answer to the perennial problems, the rusting hot water tank (Chem. Age, 1948, 58; 433). A magnesium rod (technically an anode) introduced into the tank by means of a special fitting, becomes self-sacrificing and disintegrates in place of the tank walls. The anodes are made from small-diameter magnesium rods of special alloy and contain a core of steel wire to prevent break up of the anode at points where concentrated attack takes place. They can be used on any size or type of water-heater without affecting hot water draw-off. A rod, extending the full length of the tank, has a 6-year life, though it may need replacement at an earlier or later date depending upon the characteristics of the water.

RUST INHIBITING PIGMENT.

Ammonium Ferrous Phosphate ($NH_4FePO_4 . H_2O$), containing not less than 7 per cent ammonia and not more than 10 per cent ferric iron has rust-inhibiting properties. It is prepared by treating a solution of copperas with secondary $(NH_4)_2HPO_4$ in the presence of sodium hydroxide to maintain a pH 6.9-9.0 at a temperature above 130°F. Heating is continued until the precipitate is converted to flake-like crystalline material. The product is filtered, washed, dried and pulverised. It may be used in this form as the sole pigmenting agent in organic vehicles or in combination with other pigments, preferably with zinc yellow or zinc oxide.

Paints containing the pigment show a greatly improved adherence to metal surfaces and they dry more rapidly, particularly with phenolic resins. The action of the rust inhibitor is due to the liberation of ammonia, which acts as a protective layer against attack by acid vapours. (Building Science Abstracts 1947, 20, 265.).

Formulas, Processes & Answers

HANDKERCHIEF SCENT.

5177 M.C.R., Manikpur—Wants to have recipes of handkerchief scent.

I.

Otto of Jasmine	1	dr.
Flora Jasmine	2	"
Heiko Jasmine	1	"
Otto de rose	30	mins.
Essence Neroli	2	dr.
Essence Musk	2	oz.
Rectified spirit	24	"

Mix.

II.

Essence Chameli	16	oz.
" Rose	4	"
" Jasmine	1	"
" Neroli	½	"
" Amber	½	"
" Musk	½	"

Mix and keep aside for a fortnight to mature. Then take 1½ oz. of this mixture and mix it with 24 oz. of rectified spirit.

TINCTURE BENZOIN COMPOUND

(Friars' Balsam).

5218 A.L.N., Puri—Wishes to have a formula of preparing tincture benzoin compound and also the process of making papain.

Benzoin, in powder	100	grms.
Storax	75	"
Balsam of tolu	25	"
Aloes	20	"

Alcohol (90 per cent.)—sufficient to produce—1000 millilitres.

Macerate the benzoin, storax, balsam of tolu, and aloes with 800 millilitres of the alcohol in a closed vessel for 2 days, shaking occasionally; filter; pass sufficient of the alcohol through the filter to produce the required volume.

PAPAIN.

The best method to prepare papain is to collect the juice of unripe papaw by making shallow longitudinal incision about ⅛ inch deep in the well grown fruits, by means of a non-metallic knife such as a bone or ebonite knife.

Fruits in which only three to four incisions are made simultaneously can be incised again after a day or two. The juice resembles a white thin sticky latex which coagulates rapidly.

The fruits should be incised in the earl morning and the juice strained through musli and dried at about 35°C for two days, when forms a cream coloured brittle mass with an u pleasant odour. The mass can be ground t a powder.

The juice should be collected in glaze earthenware and a trace of formalin added t the juice which will prevent decompositior Small quantities of juice may be dried in th sun on sheets of glass. Large quantities how ever are prepared preferably by spreading th juice on linen trays made by stretching brow linen on wooden frames placed over a hot ai chamber of bricks avoiding excessive heat. Fo this purpose an iron plate covered with 2 to inches of sand between the fire and the hot ai chamber may be used with the trays about on foot above the plate.

Artificial drying in this way should be don below 100°C. On a large scale however, vacu um dryingwould be found to be very efficient The juice contracts in drying and the con tents of several trays can be placed subsequent ly in one to complete the drying. The juice should be dried till it is crisp and capable of being reduced to a powder. A cream coloured or white powder is obtained. The yield of crude dried material amounts to about 16 to 18 per cent. of the weights of the juice

After drying the mass is ground, while still warm in as one mortar with a stone pestle The crude product is a white amorphous powder In order to purify this impure substance, it is treated with a sufficient quantity of abso lute alcohol and it is found that about 75 per cent. of the crude mass is dissolved in it It is then filtered and the filtrate on evaporation gives rise to pure substance; but the usual practice is to distil off the alcohohl, which can be used again.

SYNTHETIC CAMPHOR.

5307 K.A.K., Madura—Desires to have a process of preparing synthetic camphor.

The starting point for the preparation of artificial camphor is pinene, a terpene hydrocarbon, which may be obtained pure by the fractional distillation of turpentine oil.

Two main types of process for synthetic camphor manufacture exist viz., those which proceed by converting pinene into a hydrochloride derivative, and those which treat pinene with organic acids.

In the first process dry hydrochloric acid gas is led into dry pinene, and the white solid product pinene hydrochloride is isolated. The chlorine atom is removed by heating with alkaline reagents, when a hydro-carbon, camphene, is obtained. This when treated with the lower fatty acids and a little hydrochloric acid forms an ester of isoborneol and also (a little) of bor-

neol. Next the isoborneol and borneol is obtained from the ester by saponifying, and converted into camphor by gentle oxidation. The yield of camphor from solid pinene hydrochloride may amount to 95 per cent. of the theory.

In the German Patent, Process of Bertram camphene is converted into the ester of isoborneols and borneols by treating with acetic acid and a little concentrated sulphuric acid below 50°C and then saponified the resulting ester with production of borneol and isoborneol.

The oxidation of borneol and isoborneol is covered by numerous patents, such usual agents as air, oxygen, ozone, chlorine, nitric acid, potassium permanganate etc. being used. By treating camphene with ozone, Richardson and Northeim converted camphene directly into camphor with a yield of 80 per cent. of theory.

In the other process Pinene (or turpentine oil) is heated at 100°C. for thirty-six hours with acetic acid, when borneol acetate is obtained. This on saponifying yields borneol, and isoborneol, which are then converted into camphor by oxidation as before.

The yield is bad by this method; such products as limonene, dipenene, and others are generated from the pinene. Hence, although the method is extraordinarily simple, the methods comprised under first process still hold the field.

The above is the skeleton of the two processes. No detail of the processes is available as it has been kept secret by the manufacturers.

REFINING COCONUT OIL.

5524 S.B.F., Vaniyambadi—Desires to know processes of refining coconut and groundnut oils.

The process consists in boiling for a few hours the amount of oil to be refined with a 2 per cent. solution of sodium silicate, removing the soap formed and finally washing and drying the oil. The weight of sodium silicate used for a given quantity of oil depends upon the free fatty acid content of the oil and alkalinity of the silicate. The quantity of sodium silicate taken is such that its alkalinity is exactly equivalent to the acidity of the oil. Usually with an oil of 3 per cent. acidity, the quantity of sodium silicate of 40°Tw. required is 1.6 lbs. per 100 lbs. of the oil.

The oil, taken in a vessel with a tapering bottom and a stop-cock, is heated to about 80°C, and its equivalent of 2 per cent. silicate solution previously warmed to about 50°C, is poured slowly into it with vigorous stirring. The heating is continued for some time till the liquid comes to boiling. Then as the boiling goes on, water is poured in from time to time to make up for the loss by evaporation and this is continued for about two and a half hours. By this time the issuing steam is found to have hardly any odour of coconut oil. At this stage, about 5 lbs. of powdered common salt are added, and the whole boiled for a few minutes to coagulate the soap formed. The liquid is then allowed to stand, and the emulsion of soap and silicic acid is carefully drawn off from the bottom. The residual oil is given two or three washings with hot water, till the wash liquid no longer gives any altkaline reaction. After every washing the wash water is drawn off from the bottom. The washed oil is then heated in a shallow dish with constant stirring to drive out any residual moisture.

The oil may finally be mixed with 1 per cent. fuller's earth and filtered, when the oil is perfectly clear, bright and without any perceptible odour.

The product obtained by the above process is suitable for making hair oils.

REFINING GROUNDNUT OIL.

The groundnut oil as expressed from the seed is liable to contain mucilage and albuminous matters, which produce turbidity in the oil. In order to remove these impurities filter the oil through a filter press; but before doing so treat the oil with 10 per cent. of its weight fuller's earth, which should be dehydrated by roasting prior to use. Mix thoroughly and then heat the mixture to 100°F, and maintain the temperature constant for about 15 minutes. Lastly filter the oil through filter press. Thus a clear oil is obtained but the odour of the oil is somewhat earthy. To remove this bad odour wash the oil with 1 per cent. solution of brine containing an equal amount of dry sodium bicarbonate.

ROTATING WHEEL.

5380 S.R.M., Kumbakonam—Wants to have recipes of making rotating wheel, green showers, etc.

Wheels are made of long, narrow paper tubes filled with a mixture of meal powder (2 parts) and potassium nitrate (1 part) and sulphur (1 part), and then wrapped round a circular wooden disc. When a pin is placed through the centre the disc to act as a spindle and one end of the paper tube ignited, the escaping gas causes the wheel to revolve.

GREEN SHOWERS.

Potassium chlorate	12	parts.
Sugar	11	"
Barium nitrate	15	"
Mercurious chloride	11	"

BLUE SHOWERS.

Potassium chlorate	80	parts.
Sugar	50	"
Cuprous sulphide	30	"
Mercurious chloride	40	"

GOLDEN SHOWERS.

Nitre	6	tolas
Sulphur	2	tolas 6 as.
Charcoal	1	tola 8 as.
Gun powder	6	tolas,
Lampblack	12	annas.

Powder separately, mix well and pack in light paper cans. This will give a shower of gold rain.

GALVANISING IRON BY DIPPING.

5v99 S.B.H., Calcutta—Desires to know the process of galvanising iron by dipping.

The sheets of iron are immersed in a bath of hot dilute sulphuric acid to remove oxide, and then washed with water; the plates are then immersed in commercial hydrochloric acid after which they are dried in a hot oven. The zinc is melted in a large iron pan along the middle of which an iron screen is fixed, so that it just enters into the bath and extends about 8 inches above the rim; the surface of the zinc is thus divided longitudinally into two compartments; ammonium chloride is strewn on the surface of one and in the other sand. The iron plates, hot from the oven, are dipped at a time perpendicularly into the melting zinc on the ammonium chloride side, and are passed under the iron screen into the other side, whence they are drawn out by tongs and pulleys. Drops of zinc are removed from the lower edge by touching with an iron rod. When they are completely removed from the bath, the sand is wiped off and the plate is finished.

AQUA PUDINA CONCENTRATED.

5497 A.R., Bhagalpur—Wishes to have a formula of preparing aqua pudina concentrated.

Pudina oil	20	millilitres.
Alcohol (90 per cent.)	600	"
Distilled water, sufficient to produce	1000	"

Dissolve the pudina oil in the alcohol, and add sufficient distilled water in successive small quantities to produce 1000 millilitres shaking vigorously after each addition. Add 50 grams of powdered talc, and shake; set aside for a few hours, with occasional shaking; filter.

Dose:—5 to 15 minims.

SHAVING SOAP.

5404 I.H., Surat—Desires to know a formula and process of making cup soap.

Tallow		10	lbs.
Coconut oil		2	"
Caustic soda lye 38°Be.		5	"
Caustic potash lye 36°Be.		1	"
Gum tragacanth		½	"
Water		1	"
Perfume with	Caraway oil	1	oz.
—do—	Lavender oil	½	"
—do—	Thyme oil	2	dr.
—do—	Tinct. of Musk	2	"
—do—	Terpenol	½	"

Melt the tallow and coconut oil together over slow fire and keep aside. Again mix with the caustic soda and potash lyes in another vessel. Put the mixture in the tallow coconut oil mixture and stir well as is usually done in the cold process. When the soap begins to condense, mix the perfume, frame it and cover it up. Gum tragacanth should be dissolved well in water and mixed before the addition of perfume. Next cut into cubes and mould in the form of cups.

PLASTER OF PARIS.

54 B.K.B., Lahore—Wants to know process of manufacturing plaster of Paris.

Plaster of Paris is usually manufacture from gypsum. For this purpose first grind th gypsum into powder in a disintegrator; then pas it through 100-120 mesh screen. The fin powder thus obtained is heated to about 120° in an iron vessel and kept at this temperatu for some time. During this period st the material with a ladle.

PRECIPITATED CHALK.

This is prepared by adding a solution carbonate of soda to a solution of chloride calcium (both cold) as long as a precipita forms. This at last is well washed with wat and dried out of the dust.

IMPROVED COLD PROCESS FOR SOAP.

91 S.A.W., Kathiawar—Desires to lea the improved cold process for soap.

Into a crutching pan 459.5 lbs. of coconut or palm oil are run in at the usual cold process temperature, 86-90°F, while the stirrer is moving at 18 revolutions per minute.

437.5 lbs. of NaOH solution made from 98% caustic and at a strength of 32°Be are then added and intimately mixed, the temperature of the NaOH solution being 680 70°F.

Rosin and oil in the proportion of 40% rosin to 60% oil or the like previously heated to 200°F and mixed together is cooled to 100-120°F and is treated with caustic potash solution. In this example this quantity of rosin-oil mixture is 204 lbs. and the caustic potash solution 12.5 lbs. at a strength of 28°Be. The whole of this mixture is then added to the crutcher contents and after brief mixing of 15 seconds the stirring device is stopped. It will be observed that at this stage the total alkali is insufficient for complete saponification of the total oil and rosin. The mass quickly solidifies after the addition of the rosin mixture but after a period of 8-10 minutes the mass becomes liquefied by the evolution of heat. At this stage the stirring device is set in and 30 lbs. of weak caustic soda solution at a strength of 9°Be (temperature, 168-170°F) is then crutched into the mass to complete the saponification of the existing neutral oil. When the saponification is complete fillers may be crutched into the soap, if desired, after which the whole is discharged through large outlet valves into cooling frames.

—Indian Soap Journal.

HINTS TO MAKE SAFETY RAZOR BLADE.

98 S.S.S., Bombay—Wishes to be enlightened with useful hints to make safety razor blades.

Safety razor blades are made of special type of steel, which produces sharp cutting qualities. The selected band steel is first heated to 700°C. and then passed into cold-rolling mill, where it passes through a series of rolling mills several times. The soft steel thus produced is first notched and perforated, that is the lateral curves of the blade are impressed and the three holes are punched out. The band which is just held together by narrow strips of metal, then passes through a furnace, generally heated by gas. The temperature of this furnace must be maintained constant and in no way should be allowed to fluctuate.

After this hardening process comes the tempering, that is, the heating up again of the cooled material to a definite temperature, which is lower than that employed for the hardening. This has the effect of neutralizing the stresses in the steel band and of increasing its tenacity. The band is now broken off at the points where the notches are, and the lines of fracture are ground smooth. The short lengths of steel thus produced are the rough blades.

The further treatment of these rough blades to a keen-edged razor blade is the culminating point of the manufacturing process, and is thus a task that can only be carried out by experts if the purpose of this sensitive cutting is to [illegible] properly fulfilled.

The first preliminary operation is the clea[ning] of the rough blade and the freeing of [it] from oil, so as to prepare it for the etching pr[o]cess which follows. The words or marks to [be] found on almost all blades, whether they are [a] trade mark or sign of the manufacturer, or [an] indication of the quality or origin of the blad[e] are applied with a rubber stamp using an etc[h]ing liquid that corrodes the steel material. Fro[m] the etching machine, which is usually automati[c] the blade enters a bath of paraffin or petr[ol] which prevents the acid from corroding th[e] metal further, and thus obviates any danger [of] rusting. The blades are then dried in so-call[ed] rumblers.

INCENSE STICKS.

147 R.M.S., Sultanpur—Wants to know [a] good formula of making incense sticks.

Musk		10	grains.
Ambergris		10	„
Powdered	benzoin	1	oz.
„	Camphor	1	„
„	Cascarilla	1	dr.
„	Nitre	1	„
„	Charcoal	2	oz.

Mix and make in a thin paste with muc[i]lage of tragacanth, when sticks are made by di[p]ping thin wooden splinters into the emulsion.

ELECTRICAL PROCELAIN.

34 C.M.E., Karachi—Desires to know process of making electrical porcelain.

Hard vetrified porcelains when glaz[ed] with a proper glaze make very efficient insul[a]tors for high tension electric current.

The folowing are some practical compos[i]tions of insulator bodies and glazes.

COMPOSITION OF BODIES.

	I.	II.	III.	
Kaolin	45	48	53	parts.
Felspar	30	35	16	„
Quartz	25	17	21	„
Steatite	—	—	10	„

Body No. 1 is suitable for telegraphic i[n]sulator and matures between cones 12 and 1[3] Nos. 2 and 3 are high tension electrical p[or]celains maturing between cones 13 and 14.

GLAZE COMPOSITIONS.

	I.	II.	III.	
Felspar	42	40	34	parts.
Quartz	41	42	45 5	„
Dolomite	10	9	7.5	„
Kaolin	7	9	13	„

Glaze No. 1 is suitable for the telegraph insulators which the others are for the hig[h] tension bodies.

POLISHING GRANITE STONES.

192 C.M.S., Colombo—Desires to have the process of polishing granite stones.

Polished granite is used widely for monuments and ornamental building purposes. The process of polishing granite is carried out in successive stages, such as ironing, emerying, honing and buffing.

IRONING.

Surfaced or sawed blocks are placed in groups of 8 or 10 on a timber bed with their upper surfaces on an even plane. The rectangular group of blocks is surrounded by a wooden box, with the bottom a little lower than the surface of the rock. All cracks in the box and between the blocks are filled with plaster of paris. A worker guides a belt driven revolving head over the blocks, and steel shot with water coming between the rotating head and the stone gradually wear down the surface. The rotary head, known as a "scroll," is a series of concentric or spiral iron rings or segments of various patterns, some of which are broken or notched. The patterns are designed to keep the abrasive under the scroll as long as possible and to make it cut effectively. For machines guided by hand scrolls may be 3 or 4 feet in diameter. The process of thus wearing down a surface with steel shot is known locally as "ironing." Two beds usually are provided within reach of each machine, and, while stone on one is being smoothed, blocks are being levelled and set in plaster on the other, thus the machine may be kept in almost constant use.

EMERYING.

The next step, known as "emerying," produces a smoother finish. It requires a lighter scroll and emery or more commonly, carborundum powder, as abrasive. Three or four grades of abrasive successively finer in grain size are employed, the coarser being washed carefully from the surface before the next is added.

BUFFING.

For the final polishing process, generally known as "buffing," a buffer head is operated in the same way as the scrolls. It consists of a circular disc mounted with numerous folds of felt. Putty powder (extremely fine-grained tin oxide) is added, with a moderate supply of water. If more than one surface is to be polished the block is turned and reset in another bed, small surfaces, and designs in other than flat surfaces are polished by hand methods.

Ornamental granite in sound blocks absolutely free from incipient seams is widely used for columns. The shaping, turning, and polishing of columns are a distinct granite cutting art. The block first is roughed out to an approximately cylindrical form by drilling, wedging, shaping, with a bull sett, and dressing down with hand hammer and chisel. Exceptionally, a cylindrical block of granite is cut by means of a rotating drum fed with steel shot.

The rough cylinder is mounted in a lathe in which it rotates slowly. One or more steel discs are mounted on axes inclined about 45° to the axis of the column. The disc turns freely as its edge comes in contact with the rotating column. As the disc travels slowly lengthwise to the column it chips oy projections and gradually works the surface to a uniform cylindrical form. The column is then ground smooth with steel shot, followed by emery or other abrasive, and polished with putty powder on buffing pads held against it as it rotates.

For polishing small curved surfaces a piece of iron pipe is held firmly against the rock and moved back and forth while an abrasive mud is added. Very beautiful polished objects are thus manufactured.

CEMENT FOR PROCELAIN.

194 P.K.K., Trivandrum—Wants to know a good recipe of preparing cement for porcelain.

Isinglass	1	oz.
Powdered glue	1	dr.
Distilled water	2	oz.
Salicylic acid	10	gr.

Put the isinglass and glue in a gallipot add the salicylic acid and the water, pressing down the isinglass with a pestle until it is all soaked Place the gallipot in a saucepan of water, bring to the boil, stirring until dissolved, then add

Acetic acid (33 per cent). 1 oz.

Mix well, and pour into bottles.

CEMENT.

279 W.I.C.I., Honawar—Wishes to know a process of manufacturing cement.

The process of manufacturing cement is rather complicated using various types of machineries suitable only for a very large scale production. The assistance and guidance of an expert is needed. Then outline of the process is, however, given below.

The raw material for cement are limestone and clay rich in silica. These are very inti

mately mixed, and two methods are used for this purpose according to the nature of raw materials. The dry process is employed where the raw materials available are hard and contain practically no moisture (e.g. lime stone and shale). These are very intimately ground in a ball mill so that about 80 per cent. of the mixture passes through a 200 mesh sieve. These are then burnt in revolving furnace about 60-200 ft. long and 6-8 ft. in diameter having a fire clay lining. The temperature of burning is about 1400°-1600°C. The burnt mass is taken out after about 3 hours, cooled and again ground fine.

The wet process is employed where the raw materials are soft and contain a greater percentage of water (e.g. chalk and clay). In this method the materials are ground in edge-runners with heavy rolls and water is added so that a slime is produced. The slime is then pumped into a tube-mill where a far greater and finer grinding is effected. The slime is then settled in tanks and the sediment is pressed into bricks and burnt in Hoffman's Ring furnace or the slime may be directly fed into the revolving furnace. The mass attains a gravel like shape when taken out of the furnace. The cooled product is then given a very fine grinding in a ball mill or any other type of mill.

GERMAN SILVER ALLOY.

281 L.N.J., Furrukhabad—Wants to have a good recipe of German Silver Alloy.

The composition of this alloy varies considerably; good recipe is as follows:—

Copper	8 parts.
Zinc	3½ „
Nickel	4 „

Melt in a fire clay crucible and cast into ingots.

PHOTOGRAPHIC DEVELOPING SOLUTION.

297 P.P., Meerut City—Wishes to have a good formula of preparing photographic developing solution.

First prepare two stock solutions and mix in the proportion given.

STOCK SOLUTION A.

Pyro	4 oz.
Sodium bisulphite pure	32 gr.
Potassium bromide	32 gr.
Distilled water	64 lbs.

Dissolve in a glass or enamel vessel.

STOCK SOLUTION B.

Sodium sulphite pure	7 oz.
Sodium carbonate	5 oz.
Distilled water	64 oz.

Dissolve in another glass or enamel vessel

To use take the following proportions:—

Stock Solution A	2 oz.
Stock Solution B	2 oz.
Distilled water	16 oz.

At a temperature of 65°T. this developer requires about 8 minutes.

PANPAR.

299 J.M., Calcutta—Wants to have a process of making panpar.

Soak moong pulse in water; remove the bran by rasping in several changes of water Strain away the water and bray the soft pulses into a fine paste. Incorporate gradually into this paste a quantity of fine gram meal sufficient to convert the mass into a stiff dough Knead the dough intermittently with the addition of the meal for 2 or 3 hours. Divide the mass into small bits and roll out each into thin circular flaps dusting with gram meal. Keep them separately. Dust them when dry and pack in tin containers.

LIME-JUICE AND GLYCERINE.

500 A.P.I.W., Tezpur—Wishes to know a formula of lime-juice and glycerine.

Almond oil	4 fl. oz.
Glycerin	1 fl. oz.
Tincture of senegal	2 dr.
Lime water	½ fl. oz.
Rose water	8 fl. oz.
Oil of bergamot	20 drops.
Oil of lemon	40 drops.

Shake well the oil of almond and tincture of senegal and then add glycerine, lime water and rose water. Lastly perfume with essential oils. To preserve the cream add 4 grains of salicylic acid to each pint of the cream.

BOTTLE-CAPPING SOLUTION.

Gelatin	500 parts.
Gum acacia	100 „
Salicylic acid	4 „
Water	1400 „
Starch	200 „
Aniline dye	a sufficiently

Heat the gelatin, gum acacia and salicylic acid with 1000 parts of water. Strain, add the starch and the remainder of the water as well as the dye. For use, warm the paste and dip the neck of the bottle into the paste.

BLACK SHOE POLISH.

312 G.S., Tripunithura—Wants to have formulas of preparing black and brown shoe polishes.

Carnauba wax	10	oz.
Beeswax	8	oz.
Stearin	1	oz.
Oleic acid	1	oz.
Turpentine oil	45	oz.
Ivory black	4	oz.
Oil-soluble black	½	oz.

Melt the first three ingredients, mix the oil soluble black with the oleic acid and add gradually the turpentine oil, with which has been incorporated the ivory black.

BROWN.

Carnauba wax	8	oz.
Sperm oil	3	oz.
Turpentine oil	12	oz.
Powdered soap	1	oz.
Oil of mirabane	1	dr.

Mix the wax and first two oils together, remove from the source of heat and add 10 oz. of the oil of turpentine carefully, constantly stirring, then add the soap and oil of turpentine, mix thoroughly and colour with Nankin brown.

METAL POLISHING POWDER.

319 V.K., Muzaffarnagar—Wishes to have a formula of metal polishing powder.

Kieselghur	4	oz.
Tartaric acid	2	oz.
Prepared chalk	2	oz.
Ferric oxide	2	oz.

Reduce the ingredients to fine powder and mix intimately,

BLACK HAIR DYE.

367 M.J.P., Bombay—Wants to have formulas of black and brown hair dyes.

Pyrogallol	5	grms.
Sodium sulphite	10	„
Ferric chloride	10	„
Distilled water	200	c.c.
Nickel nitrate	20	grms.

Dissolve the sodium sulphite in the distilled water and then the pyrogallol and finally the metallic salts. Keep in well corked bottles.

BROWN.

Pyrogallol	4	grms.
Sodium sulphite	8	„
Distilled water	200	c.c.
Cobalt nitrate	20	grms.

Proceed as before.

ABSORBENT COTTON WOOL.

352 H.C., Hoshiarpur—Desires to have a process of making absorbent cotton.

Absorbent cotton is generally prepared from cotton wool contained from one or more of the cultivated varieties of gossypium herbaceum, lime. To prepare it, take of the best quality of carded cotton batting of any desired quantity, and boil it with a 5 per cent. solution of potassium or sodium hydroxide for one-half hour, or until the cotton is entirely saturated with the solution, and the alkali has saponified all the fatty matter contained in it. Then wash thoroughly to remove all soap, and nearly all alkali; press out the excess of water, and immerse it in a 5 per cent. solution of bleaching powder for 15 or 20 minutes; again wash first with a little water, then dip in water acidulated with hydrochloric acid, and thoroughly wash with distilled water. Then press out the excess of water and again boil for 15 or 20 minutes in a 5 per cent. solution of potassium or sodium hydroxide. Now wash well, dipping in the acidulated water and washing thoroughly with pure water. Afterwards press out and dry quickly.

To prepare this important antiseptic material the ingredients are taken in the following proportions:—

	Parts by weight.
Purified cotton	90
Boric acid	12
Boiling distilled water	138

Dissolve the boric acid in the boiling water and soak the cotton in the solution, squeeze until it weighs 215 parts; dry in a closet.

ROSE WATER.

380 D.T.M., Tinnevelly—Wants to have a process of making rose water.

The flowers are plucked in the early morning and conveyed in large bags to the distillers. The apparatus for distilling is of the simplest description: it consists of a large coppered iron boiler, well tinned, capable of holding from 8 to 12 gallons with a large body, a rather narrow neck, and a mouth about 8 inches in diameter, on the top of which is fixed the head of the still. This is merely an old dekchi with a hole in the bottom to receive the tube of water which is well luted with flour and water. This tube is composed of two pieces of bamboo fastened together at an acute angle and covered in their whole length with a coating of string over which mud is luted to prevent the vapour from escaping. The lower end of the tube is carried down into a long necked vessel or receiver, called a "bhubka". This is kept in a "handi" of water, which as it gets hot is changed. The end of the tube in the bhubka is padded with cloth to keep in the vapour. The boiler is let into an earthen furnace and after being charged with the roses and a sufficient quantity of water, distillation is slowly proceeded with. A boiler of the size described will hold about 10,000 roses; about 10 seers of water will be poured on these flowers and 8 seers of rose water will be obtained. After distillation the rose water is placed in a glass carboy and exposed to the sun for several days to become ripe, after which the mouth is stopped with cotton over which a covering of moist clay is put to prevent the scent from escaping.

Brief Queries and Replies

2402 D.B., Calcutta—Following is a formula of ice cream or ice fruit. Powdered starch 1 oz.; powdered sugar 1 oz.; orange dye q.s.; essence of almond 10 mins.; essence of vanilla 10 mins. Mix well and sift. The above quantity is sufficient for a pint of milk with which it is to be mixed. then brought to the boil. and when cold put in the freezer. For starting this business you have to invest at least Rs. 25.000/-. Machinery may be had of Refrigerators (India) Ltd., Bhowanipore Road, Calcutta.

2404 J.H., Kodaikanal—For rubber cutting machine enquire of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta.

2407 K.S., Udaipur—For a small printing machine enquire of India Machinery Co., 20, Strand Road, Calcutta. Machine will cost you about Rs. 2,000/- and other materials on this Rs. 2,000/-.

2409 D.S.K., Saharanpur—Hindi equivalents of the ingredients are not known. All the ingredients may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta; Calcutta Chemical Co. Ltd., 5. Bonleld Lane, Calcutta and Champalal Agarwala, 45, Armenian Street, Calcutta.

2411 K.V.R., Bezwada—We have no book on Mantle manufacture. You may however consult Rare Earth Industry by Martin. For chemicals enquire otf Calcutta Chemical Co. Ltd., 5, Bonfeld Lane and B. K. Paul & Co. Ltd., 1 & 3, Bonfield Lane, Calcutta.

2412 G.T., Bombay—You may make lozenge and incorporate the medicine in powder to the syrup when boiling.

2416 G.S.G., Ahmedabad—We have no book on cement roofing sheet manufacture. You may however write to Newman & Co. Ltd., 3, Old Court House Street. Callutta for the book required. For machine enquire of Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta.

2419 W.M.C., Delhi—You may consult Pharmaceutical Preparations published from this office, price Rs. 3/6/- including postage.

2420 R.D.D., Calcutta—You may prepare pulp from bamboo. You should start pulp factory where bamboos are available in large quantity. It will be economic to manufacture paper from the pulp.

2422 B.A., Lyallpur—Your query is not in our line. You better consult a physician.

2424 P.R., Rajnandgaon—Wick making machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. Biscuit making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

2429 I.L.F.,t Arrah—Dissolve borax in water, then put small pieces of shellac into and stir when you will get shellac solution.

2430 P.V.N., Palghat—Small printing machines may be had of India Machinery Co., 20, Strand Road, Calcutta. For starting a press on very small scale you have to invest Rs. 5,000/-. Machine will cost you Rs. 2,000/- and Rs. 1,000/- should be kept as reserve fund. Following is a list of homeo chemists. Hannemann Publishing Co., 1 & 5, Bowbazar Street, Calcutta and M. Bhattacharyya & Co., 84, Netaji Subhas Road, Calcutta.

2434 K.R.B., Gauhati—Fruit juice extracting machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

2438 K.M.G., Goalpara—You should use amyl-acetate for mending celluloid fountain pen. Amyl-acetate may be had of Calcutta Chemical Co. Ltd., 5, Bonfield Lane, Calcutta.

2439 I.T.C., Sultanganj—A formula of good varnish will appear in an early issue of Industry.

2443 R.G.K., Madura—For obtaining permit of paper write to Special Paper Officer, Supply and Industry Department, New Delhi.

2445 B.B., Kathmandu—Corrugated sheets may be had of B. B. Paul & Co., 18, Raja Woodmunt Street, Calcutta and Natobar Sett, 3, Darmahatta Street, Calcutta. For tractors enquire of Volkart Bros., 8, Netaji Subhas Road, Calcutta. For pumps enquire of Worthington Simpson Ltd., 10, Netaji Subhas Road, Calcutta. For cycles enquire of Bentinck Cycle Co., 1, Chowringhee. Calcutta.

2457 K.B.P., Baroda—Process of manufacturing sauces, morabbas and preserving fruit juice will be found in All About Fruits published from this office.

2458 I.B.G., Calcutta—You may start a cardboard factory. In the beginnning you may manufacture cardboard out of waste paper.

2461 M.S., Arsikere—We have no publication containing addresses of Indian and foreign universities.

2462 B.N.S., Mandalay—Process of manufacturing tinctures will be found in Pharmaceutical Preparations published from this office, price Rs. 3/6/- including postage.

2463 S.I.W., Karachi—Articles on heavy chemical manufacture appeared in July and August 1948 issues of Industry. All kinds of alcohol are obtained by distilling process. You should use any form of sulphides for removing hair. You may use sodium sulphide or strontium sulphide.

2464 L.C.W., Bombay—Formulas of hair dyes and marking ink will appear in an early issue of Indusry.

2465 S.R.G., Jalpaiguri—Process of dyeing yarn and cloth will be found in Cotton Dyeing and Printing published from this office, price Rs. 3/6/- including postage.

2467 G.S.B., Pondichery—Process of manufacturing crystal receivers will be found in any book on radio which may be had of W. Newman & Co., Ltd., 3, Old Court House Street, Calcutta.

2468 J.L.S.L.S., Almora—Following is a list of arms and ammunition dealers: Esoofally Mahomedally & Co., 102-104, Bhusari Mohalla, Bombay; D. N. Biswas & Co., 10, Dalhousie Square East, Calcutta; R. B. Rodda & Co., Ltd., 2, Wellesley Place, Calcutta and Elahee Baksh & Co., Kashmere Gate, Delhi.

2470 A.A.K., Cochin—We are not aware of medical use of soapnut.

2472 C.P., Unjha—Following is a formula of laundry blue: Ultramarine blue 6 oz.; sodium carbonate 4 oz.; glucose 1 oz. Make a thick paste roll into sheets and cut into tablets. Process of manufacturing ultramarine blue appeared in August 1947 issue of Industry.

2477 M.S.S.S., Agra City—Process of manufacturing sole polish will appear in an early issue of Industry.

2479 S.L., Nainital—It is not possible to manufacturing soap without caustic soda.

2480 I.W.C., Bombay—We are not aware of any firm manufacturing plastic buttons. For import statistics write to Director of Commercial Intelligence, 1, Council House Street, Calcutta. For obtaining import license write to The Controller of Import, New Delhi.

2482 M.J.B., Masulipatam—To remove small pox mark wash the affected part with green coconut water regularly.

2486 H.S., Alirajpur—Process of enamelling on gold, silver and copper will appear in an early issue of Industry.

2488 G.I.P.W., Tinsukia—For manufacturing candles you have to melt hard paraffin and pour it into candle mould fitted with wicks. Candle moulds may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

2491 N.S., Tharrawaddy—Following is a formula of black sealing wax: Shellac 20 parts; rosin 12 parts; venice turpentine 22 parts; talc 17 parts; carbon black 25 parts. In course of preparation shellac is made into thin sheets by pulling with two hands and two legs.

2492 D.A., Wai—For fret work you may use plywood. For machines enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. You may start fret work with Rs. 2,000/- on a small scale.

2498 T.N.R., Motihari—Regarding biscuit flavour all the ingredients should be mixed and kept for use when required.

2499 R.D.C.C., Coimbatore—Following is a list of calendar printers: Calendar Mfg. Co., 62-66, Meadows Street, Fort, Bombay; Calcutta Chromotype Ltd., 1, Gibson Lane, Calcutta; Eagle Lithographing Co. Ltd., 26, Christopher Road, Calcutta; Tower Halftone Co., 14-C, Kanalitola Lane, Calcutta; Delhi Calendar Manufacturing Co., Kashmere Gate, Delhi and Diamond Calendar Mfg. Co., Punjabi Press, Sadar Bazar, Delhi.

2502 K.N.B., Hissar—An article on the manufacture of radio sets and accessories will appear in an early issue of Industry.

2506 S.M.C.A., Nagina—Paper manufacturing plants are not available in India. You may however indent through Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta.

2509 R.G., Gwalior—Process of deodorising coconut oil and refining groundnut oil will be found in Vegetable Oil Industry published from this office, price Rs. 3/6/- including postage.

2513 D.C.A., Seoni—For starting a shellac factory on large scale you should invest at least Rs. 10 lakhs. For books write to Lac Research Institute, Nankum, Ranchi. For obtaining export license you may write to Controller of Export, New Delhi. Yes you may start an oil mill and paint and dyes industry side by side.

2515 N.R.B., Kirkee—Rosin is required in manufacturing paints and varnishes, soap, disinfecting fluid and some adhesive paste.

2516 P.R.A., Chhapra—Process of manufacturing syrup hypophosphite of lime will appear in an early issue of Industry.

2517 B.M.K., Sambalpur—A formula of waterproof tracing ink will appear in an early issue of Industry.

2518 E.M.S.A., Madras—Carborandum may be had of William Jacks & Co., Ltd., 10, Netaji Subhas Road, Calcutta. Carborandum is crystalline silican carbide.

2519 P.L.S.t, Nainital—Wants to be put in touch with the suppliers of black betelnuts in Madras Presidency. Hard coal may be had of Bengal Giridih Coal Co. Ltd., Giridih, E.I. Ry. and Equitable Coal Co. Ltd., Dishergarh, Burdwan. Following is a list of fruit dealers: Delawar Jan Md. Aric, 12, Ramlochan Mullick Street and Mohamed Bukhsh, 12, Ramlochan Mullick Street, both of Calcutta.

2521 P.A.R., Berhampur—Collapsible tubes may be had of Metal Box Co. of India Ltd., B2, Hide Road, Kidderpur, Calcutta. Pearliness of snow will appear on keeping.

2523 I.D.M., Delhi—Rosin and other vegetable oil may be had of Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane, Calcutta.

2527 K.B.P., Gaya—Cardboard box making machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. Cardboard may be had of India Papers Board Mills Ltd., 71, Satgachi Road, Dum Dum, Near Calcutta.

2534 J.N.C., Sylhet—In manufacturing ink you should use 1 dr. acid blue in each formula. You should use gum acacia in each formula for keeping the undissolved ingredients in suspension. Dyes may be had of Imperial Chemical Industries (India) Ltd., 18, Strand Rd., Calcutta and East India Colour Co., 34, Armenian Street, Calcutta. All the machines you require may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

2538 S.G.S.B., Hoshiarpur—Questions are replied by post on receipt of 8 annas stamp for each question.

2539 K.P., Meerut—You can make beedis and sell in the market. This business will require least investment.

2540 S.P.S., Solan—For postal training on homoeopathy you may write to International Institute, Aligarh and Vocational University, Amritsar. You may try recipes published in Pharmaceutical Preparations.

2512 K.C.S., Chapra—In manufacturing candles hard paraffin is used which is the cheapest wax available in the market.

2547 J.R.M., Lakhipur—Following is a formula of zinc ointment: Acid carbolic 5 parts; zinc oxide 10 parts; camphor 10 parts; ceraflora 15 parts; vaseline 60 parts. Gum arabic and ferrous sulphate may be had of Banshidhar Dutt, 126, Khengrapatty Street, Caucutta

2548 V.K., Moradabad—For drug grinding machines enquire of Prabartak Commercial Corporation Ltd., 61, Bowbazar Street, Calcutta. Bottles are filled with spatula.

2549 R.C.B., Dugadda—All the addresses you require will be found in Industry Year Book & Directory 1948.

2551 R.D.R., Uganda—Soap making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

2555 Y.S., Indore—Details regarding permanent hair waving are not available. It is still in experimental stage.

2556 D. K., Ahmedabad—Electroplating machines and chemicals may be had of Alfred Herbert (India) Ltd., 13-3, Strand Road, Calcutta.

2562 N.P., Saharanpur—All the chemicals and other requisites of photo film may be had of Calcutta Photographic Stores & Agency Co. Ltd., 154, Dharamtala Street, Calcutta. Recipes of development solution will appear in an early issue of Industry.

2564 S.S., Puri—You may take up manufacture of washing soap with Rs. 3,000/- on a small scale. You may also try biri making, ink manufacture, office paste manufacture, etc., with the above amount.

2566 S.H.D., Hosangabad—For grinding machines, rice huller, etc., enquire of Marshall Sons & Co. Ltd., 99, Netaji Subhas Road, Calcutta and Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta.

2567 G.I.D., Bombay—You may undertake cotton dyeing printing industry which is paying no doubt. For machines enquire of W. H. Brady & Co. Ltd., Church Gate Street, Fort, Bombay.

2572 K.P.N., Bombay—In manufacturing ice cream you may use milk powder in place of fresh milk.

2577 A.A., Malda—We have no directory of foreign countries. You may however enquire of International Book House Ltd., Ash Lane, Opp. Clock Tower, Fort, Bombay and Thacker Spink Co. (1933) Ltd., 3, Esplanade East, Calcutta.

2579 A.A.B.M.C., Ghaziabad—Process of bleaching and dyeing bristles and setting them to brush will appear in an early issue of Industry.

2581 H.L.S., Baroda—Process of utilising wate rubber and tin printing will appear in an early issue of Industry.

2583 B.B., Kanpur—You may start sporting goods manufacture such as cricketbats, tennis and badminton rackets, cricket balls, etc. If this does not suit your taste you may start a hosiery factory. For machines and estimates enquire of A. Sayal & Co., 7C, Ramnagar, New Delhi and W. H. Brady & Co., Ltd., Mercantile Bldgs., Lall Bazar, Calcutta.

2588 C.K.U., Sangli—Process of developing photo negatives will appear in an early issue of Industry.

2592 R.J.P.C., Ahmednagar—For scorpion bite you may try the following recipe: Salicylic acid 15 gr.; collodion 2½ dr.; spirit of ammonia 5½ dr.

2598 V.S., Jeypore—Patterns are made of wood because they are light and handy. All foundry owners will require patterns of wood.

2600 R.S., Benares—Wants to be put in touch with the firms doing business with Pakistan.

2604 J.O.M., Rewari—Process of extracting oil from castor seeds will be found in Vegetable Oil Industry published from this office, price Rs. 3-6 including postage.

2606 N.R.T., Lucknow—Make pattern with the ink and transfer this on the cloth and iron.

2608 T.S.W., Bogra—Process of manufacturing sodium silicate will be found in Industry Prize Articles part I published from this office, Re. 1-14 including postage.

2609 D.G.O.M., Poona—You may consult Vegetable Oil Industry published from this office, price Rs. 3-6 including postage.

2610 V.P.S., Ahmedabad—A good formula of washing soap appeared in September 1948 issue of Industry.

2611 N.A.Q., Peshawar—You may use decorticating machines for removing husks of psyllium seeds.

2612 N.D.W., Hubli—Process of manufacturing monople soap and naphthol soap will appear in an early issue of Industry.

2614 S.M.D., Ambala—Formulas of office paste, paper varnish, ink and composition cork will appear in an early issue of Industry.

2616 K.S., Delhi—You may try the following recipe: Salicylic acid 320 grains; benzoic acid 480 grains; resorcin 240 grains: coconut oil 1 oz.; lanoline 1 lb. mix intimately.

2618 K.K.D.C., Belgaum—Recipes of patent and proprietory medicines are not available.

2619 I.C.C., Calcutta—Following is the process of manufacturing indestructible ink: Ten parts of good caustic potash is dissolved in boiling water, 4 parts of comminuted leather waste and 2 parts of flowers of sulphur are boiled to dryness in a cast iron vessel. The dry substance is then heated, with constant stirring, until it becomes soft, care being taken to prevent it from igniting. Sufficient water is gradually and carefully added until the liquid assumes a very dark colour, which is strained through a cloth and kept in well closed bottles. Writing on paper executed with this ink is not affected by concentrated caustic lye nor by concentrated nitric acid.

2620 I.A.S.B., Bombay—Wants to be put in touch with the manufacturers of photo enamelled button. We are not aware if any such machine is available.

2625 E.I.E.C., New Delhi—For learning process of manufacturing jams, squashes, etc., write to Agricultural School, Lyallpur, Punjab. Formulas of hair oil and depilatories will appear in an early issue of Industry.

2628 C.D.B.W., Coimbatore—For dyes enquire of the following firms: Imperial Chemical Industries (India) Ltd., 18, Strand Road; East India Colour Co., 34, Armenian Street and Hansraj Vishram & Co., 2A, Armenian Street; all of Calcutta. You should always buy dyes in original packing.

2637 N.C.K., Rajahmundry—You may start ink manufacture and face powder manufacture with Rs. 500.

2638 S.B.C., Delhi—Woven labels are made with the help of special looms. These are stuck to hosiery and ready-made garment.

2640 K.N.R., Nandigram—You have to use centrifugal machine for making sugar out of molasses. Centrifugal machine may be had of Berry Bros., 15, Netaji Subhas Road, Calcutta. It is not possible to start this industry with Rs. 2,000.

2641 M.B., Ambala Cantt.—Following is a formula of marking ink. Pyrogallic acid 1 oz.; sulphate of iron 1 oz. Mix pyrogallic acid and sulphate of iron in equal parts.

2646 W.F., Kartarpur—For floating a joint stock company you may go through "How To Do Business" by N. Banerjee published from this office, price Rs. 3-6 including postage.

2648 M.L.A.H., Kandy—We have no book on tanning. Process of tanning will appear in an early issue of Industry.

2654 B.S., Dholpur—Following is a recipe of agarbatti: Aguru 1 ch.; white damar 1 ch.; gugul 1 tola; sandal dust 4 ch.; lakhi 1 piece, cane molasses 1 tola; cassia leaves 1 tola. Mix them together and grind. Make incense sticks from the paste.

2656 S.M.H., Kanpur—You are to use distilled water in battery solution. Mica sheets need not undergo any special treatment for bending.

2659 V.S., Erandol—A good formula of fountain pen ink will appear in an early issue of Industry.

2662 B.P.A., Etawah—Following is a formula of duplicator composition: Gelatin 3 lbs.; glycerine 18 lbs.; barium sulphate 7½ lbs.; sugar 3 lbs. Cut the gelatine in small pieces and soak for 12 hours in the water then add the glycerine. Heat gently on a water bath to effect solution and then incorporate barium

sulphate and sugar thoroughly. Lastly pour into a suitable rectangular tin box.

2667 S.P.S., Kanpur — Candle making moulds may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. This industry has good prospect.

2668 S.N.S., Kanupur—You may start any industry in villages but such industries that can utilise local products should be preferred. If you can secure workers you may start celluloid industry in villages also. In Bengal celluloid industry is located at Jessore.

2669 S.G.A., Allahabad—We are not aware whether sulphur oil is manufactured from sulphur. But sulphuric acid is manufactured from sulphur. Process will be found in Chemical Industries of India published from this office, price Rs. 3/6/- including postage.

2670 S.D.B., Amraoti—Roshel oil is obtained by distilling rosha grass. Process will appear in an early issue of Industry.

2671 R.P.K., Delhi — Process of manufacturing chewing gum will appear in an early issue of Industry.

2672 J.S., Jodhpur—Reply to your letter has already been sent by post.

2673 D.N.P., Bombay—We have no book on gas mantle manufacture.

2675 M.L.D., Delhi — Process of refining groundnut oil and honey will appear in an early issue of Industry.

2676 P.R.W., Surat—Following is a formula of ruling ink: Water 10 gallons; acetic acid ½ gallon; gum arabic 4 lbs.; neutral blue 10 oz. Boil the gum in the water until completely dissolved, add acetic acid and stir in the neutral blue while hot. Then strain off. Wants to be put in touch with the suppliers of Mapkin cloth is used in ruling machines.

2681 G.C.K., Benares — Scrap iron from which tin has been recovered may be used for making fresh iron by remelting in a furnace. You may refer your query to the Director of Industries of your Province.

2688 K.V.K.M., Shimoga—Following is a formula of ultramarine blue : China clay 10 parts; sulphate of soda 41 parts; carbonate of soda 41 parts; carbon 17 parts; sulphur 13 parts and sulphite of soda 26 parts. Take the ingredients free from iron and grind fine. Next heat in a muffle furnace in closed pots. This produces white ultramarine and turns blue on exposure to air for some time. The latter is mixed with 4 per cent. sulphur and roasted in shallow pans, must be well stirred.

2689 H.S., Rajpur—Your enquiry is in the nature of an advertisement so it cannot be published in these columns. Addresses of manufacturers will be found in Industry Year Book and Directory.

2690 D.N.M., Kashipur — For cement making machines enquire of Killick Nixon & Co., Home Street, Bombay and Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta and Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta.

2692 K.B.L., Manmad—For paper per write to Controller of Paper, Industry and S ply Department, New Delhi. You have give declaration before the District Magist as a printer and publisher of the monthly.

2693 J.I., Bangalore—Process of manu turing fireclay plates will appear in an ea issue of Industry.

2696 S.P., Lashkar—For starting a pa factory you have to invest at least Rs. 1 la We have no book on paint manufacture. should engage an expert who will advise on starting the factory. You should adver in newspapers for securing an expert.

2697 H.R.N., Lucknow—Replies of ind trial and commercial enquiries are publis in these columns free of charge.

2698 J.P.C., Dinapur—For manufactur candles you have to melt hard paraffine pour into candle mould fitted with wi Paraffin may be had of Burma Shell Oil Stor & Distributing Co. Ltd., Hongkong Hou Dalhousie Square, Calcutta.

2700 G.S.D., Amritsar—Following is formula of hair dyeing oil: Take 2½ se sesamum brayed to a paste, 5 seers emb myrobalans free from seeds and bruised, 10 seers sesamum oil. Put the three ingre ents together in an iron vessel and place the sun for one month. Strain out only seers of the soaking oil and put in a fresh of 5 seers sesamum oil. Leave aside for month; strain out again 5 seers of oil. Le aside for one month; strain out again 5 se of oil and put in a third and fresh lot o seers of oil. Repeat the operation for 6 mont Then strain the whole of the oil and together the former quantities. Put in covered vessel. Amla oil prepared in this w serves as a good hair dye. Smear the he with it every day half an hour before bath. hair will be dyed black and no grey hair be noticeable.

2702 B.V.V.N.D., Ellore—For sell biri leaves you should advertise in ne papers. For selling nux vomica you n negotiate with Banshidhar Dutt, 126, Kheng patty Street, Calcutta.

2704 P.N.S., Kanpur — Soap mak materials may be had of Calcutta Mine

ply Co., Ltd., 31, Jackson Lane, Calcutta. p making machines may be had of Small hineries Mfg. Co., 22, R. G. Kar Road, :utta. For starting a soap factory on a small e you should invest at least Rs. 5,000/-.

2705 V.M., Nagpur—Formulas of rubber on stamping ink will appear in an early e of Industry.

2707 M.I., Saran—Process of manufactur- all sorts of boot creams and polishes will found in Prospective Industries published i this office, price Rs. 3/6/- including age. Process of manufacturing all kinds of will be found in Manufacture of Ink lished from this office, price Rs. 3/6/- luding postage.

2708 P.K.P., Howrah—Process of manu- uring calcium gluconate tablet will appear n early issue of Industry.

2711 S.E.R.N., Ramnad—For bronze leaf tired for book binding enquire of Calcutta ionery Supply Co., 47, Baitakkhana Road, utta and Golam Akbar Khan & Co., 27, akkhana Road, Calcutta.

2713 I.F.E.S., Raipur—Formula of petrol pump diaphram and compound for car- itor welding will appear in an early issue of istry.

2719 H.P.C., Andheri—We have no book plastic manufacture.

2722 R.C.B., Tipperah—You may start ufacture of catechu on a small scale. In connection you may consult Manufacture Catechu published from this office, price 3/6/- including postage.

2723 D.C.B., Ramgarh—Process of manu- uring matches will be found in Safety ches & Their Manufacture by K. C. Das ta which you have already got. Match ding machines may be had of Standard hinery Co. Ltd., 86B, Netaji Subhas Road, :utta. Match chemicals may be had of ed Agency, 16, Bonfields Lane, Calcutta.

2724 J.K.O., Baroda—Process of manu- uring tooth paste will appear in an early e of Industry.

2726 K.S., Delhi—You may use chloro- l or verdigris in the ointment manufactured you.

2728 G.T.I., Benares City—Reply to your ries has been sent by post.

2732 N.V.F., Madras—Process of manufac- ing sago will appear in an early issue of ustry. For machines enquire of Small chineries Mfg. Co., 22, R. G. Kar Road, cutta.

2733 A.N.C., Hooghly—Following is a nula of washing soap: Coconut oil 20 lbs.; Castor oil 12 lbs.; Mohua oil 12 lbs.; Caustic soda lye 22 lbs.; Water 4 lbs.; Silicate of soda 20 lbs.; Metanil yellow 15 grams. Heat the oil in a capacious iron vessel till these are bear- ably hot. Now little by little add the lye while stirring. Let the fire burn slowly. When the soap begins to ferment and threat- ens to overflow put out the fire altogether. Let it stand for a few minute. Then boil the whole until saponification is complete. Now pour into it silicate and 4 lbs. of water in which colour has been dissolved hot, stir it well. When the soap becomes homogeneous mix the per- fume as desired and pour it into the frame.

2734 O.P.S., Jhansi — For paper making machine enquire of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta. We have no book on paper manufacture. Process of manu- facturing blotting paper will appear in an early issue of Industry.

2735 K.S., Delhi—Following is a recipe of skin ointment:—Phenol 40 grains; Boric acid 2 dr.; Oil bergamot 90 minims; Petroleum 1 lb.; Chlorophyll 1 grain.

2738 R.C.B., Sylhet—Your enquiry is not in our line.

2740 S.B., Calcutta—Process of hydrogena- tion of fats and oils will be found in Vegetable Oil Industry published from this office, price Rs. 3/6/- including postage. For machines enquire of Marshall Sons & Co. Ltd., 99, Netaji Subhas Road, Calcutta.

2742 O.P.J., Delhi—Formulas of thinner, sewingmachine oil and hydraulic brake fluid will appear in an early issue of Industry.

2744 K.S., Delhi—we are not aware of any formula of candle giving different lights when burnt.

2746 B.N.B., Monghyr — A formula of D. D. T. solution will appear in an early issue of Industry.

2751 M.S., Bombay—Process of soldering stainless steel will appear in an early issue of Industry.

2753 S.H., Shikarpur—Following is a formula of washing powder: Yellow soap (hard) 6 parts; soap crystals 3 parts; pearl ash 1½ parts; sulphate of soda 1½ parts; palmoil 1 part. Mix the ingredients in a specially adopted mixer for heavy materials until dry and then run directly to the crusher and pulveriser.

2754 R.P.V., Ludhiana—Process of manu- facturing mantles and metal labels will appear in an early issue of Industry.

2760 G.D.L.N., Morar—Tamarind seeds are heated to 150°C for about 15 minutes. outer covering is removed by means of a decorticat ing machine. Decorticating kernel is soaked in water and then dried. Now this is powdered in a grinding machine.

2762 R.S., Hissar—Process of manufactur- ing condensed milk and milk powder will be found in Milk and Milk Products published from this office, price Rs. 3/6/- including postage. For machineries enquire of Edward Keventers Ltd., 11/3, Lindsay Street, Calcutta.

Review of Books

SMALL INDUSTRIES. Published by General Printers & Publishers, 119, Dharamtala St., Calcutta 13. Pages 94, price Rs. 3.

The author has endeavoured to remove several deep-rooted misconceptions regarding the role of small industries in our national economy. Those that hold that small industries are like wild shrubs scattered here and there, are wholly mistaken. On the other hand, the vital part these industries played in war-time economy of India, testifies to their immense economic vitality and potentiality. But these industries, as the author points out, are lamentably lacking in proper organisation. As a matter of fact these small industries can easily survive, if we are able to remove their chronic drawbacks. Besides, one of our foremost tasks is to carry on a systematic fight against the prevailing misconception that small-scale and large-scale industries are mutually exclusive and antagonistic of each other. In fact, there is a considerable scope for mutual collaboration and complementary production and adjustment of spheres of production. Though large scale-planning will be our foremest objective, we cannot afford to ignore these small industries in the present economic pattern of India. The task of improving the prospects of rural industries should be the first plank in any national programme. People in the country-side live in chronic poverty and indigence. Planned drive for small industries in the rural area are likely to give a new lease of life to rural economy. Agriculture cannot give full employment for the rural masses, so in order to engage them in useful avocations, a system of organised small industries will be very helpful.

The book is a highly informative and illuminating study of the main problems, facing the whole range of small scale industries in India. The author analyses the main defects and drawbacks in the organisation , and technique of small industries in India and points out how other nations have succeeded in planning small industries on a commercial basis, with improvements in organisation and technique.

Author, D. N. Ghose, has long held a responsible office in the Department of Industries. So the constructive suggestions that come from him are largely the product of his ripe and mature experience in the capacity of an efficient administrator. We commend this valuable book to our readers.

REPORT OF THE INDIAN TRADE MISSION TO JAPAN. Issued by Editor, Commercial Publications, Ministry of Commerce; Government of India, New Delhi. Pages 89.

It is quite in the fitness of things that an Indian Trade Mission visited Japan to explore possibilities of future trade with this country. Japan is our close Asiatic neighbour. So it is highly desirable that a mutual trade relation should grow between India and Japan for their reciprocal advantage. Japan's trade is still conducted and managed by S. C. A. P. authorities, Government to Government basis and owing to several practical difficulties, private trade is not yet functioning freely. The Mission are of opinion that these handicaps should be removed in the quickest possible time for the easy flow of normal trade channels. So far as Japan is concerned, she is also thinking in terms of a resumption of private trade as evidenced by provision of facilities, she is affording to foreign traders and manufacturers. It has been worthy of Japan to give definite assurance to India that as soon as Japan reverts to resumption of private trade, Indian traders will receive all possible facilities.

The Mission, therefore, strongly recommend that a trade commissioner should immediately be stationed in Japan so that it may be possible to take the earliest possible opportunity of establishing trade relation with Japan. The trade commissioner may furnish Indian traders with practical advices and instructions, regarding rules and regulations, so necessary for promotion of Indo-Japanese trade.

The Mission also recommend re-establishment of Post & Telegraphic connections between India and Japan for easy and rapid communication of business transactions.

The Mission strongly urge in favour of relaxation of exchange control regulations so that any Indian Bank may carry on transactions with Japan and may offer banking facilities to trade here as required by S.C.A.P.

The Mission also think that there should be some sort of provision for credit facilities

or trade with Japan at least temporarily if any substantial trade is to be built up. The Mission are in favour of special account arrangement and think that it may be arranged by an agreement with Japan that all transactions between India and Japan would be fixed through the medium of special account.

The promotion of trade between India and Japan is highly desirable in the context of India's need for capital equipment and machinery. The Mission's report renders a useful service to our trade interests and to the welfare of our country as a whole by offering practical suggestion relating to promotion of trade between India and Japan.

"PATENT OFFICE HAND BOOK". Published by the Manager of publications, Civil Lines, Delhi. Pages 269, price Re. 1/-.

Patent and designs are necessary concomitants of industrial progress and prosperity in a country. There is a certain phase in industrial progress of a country when the State has to come forward and initiate legislative enactments to avoid confusion and complications in business world.

India witnessed the first patent legislation in the year 1856. But this original act was hardly comprehensive and was therefore modified considerably in subsequent years to suit new conditions. Indian act of 1856 and 1859 afforded protection only for inventions but not for industrial designs. So to provide for the protection of designs the 'Patent and Designs' Protection Act" was passed in 1872. The Act of 1872 was followed by Act XVI, 1883. These three Acts were subsequently consolidated into a Single Act of 1883 with slight modifications and finally made up-to-date. Obviously it is not possible to evolve any static formula in the sphere of legislation. In fact, we have to review and re-orient existing rules and regulations to our own requirements from time to time.

In the formulation of patent legislation, the Indian legislators have followed, in the main, the examples of United Kingdom and have made necessary additions and alterations to suit new conditions.

"Patent Office Handbook" is really an indispensable guide to inventors of patents and designs. Here we have a very clear and lucid exposition of the exact procedure relating to patent and design registration.

The book is mainly divided into two parts. The first part embodies the Acts. Rules and Regulations with their full significance and implications, and the second part is intended for the guidance of inventors and applicants for the grant of patents and for the registration of designs in British India. The subjects that have been discussed in successive chapters of the first part may be enumerated as follows "the Indian Patents & Designs Act 1911," "Indian Patents and Designs Rules 1933." And part II deals with such important topics as "who may apply for a patent" "How to obtain a patent" "Register of Patents and Proceedings in Courts", etc.

The mere enumeration of the subjects, treated in this particular book will sufficiently show how useful the book is likely to prove to inventors and applicants.

Registration of patent and designs is, by itself, a complicated affair. And the Government have thought it necessary to set up a separate Department for proper administration with its elaborate paraphernalia.

The book furnishes necessary information relating to the inner functioning of this department and specific functions allowed to different office-bearers.

The hand book, we hope, will receive due appreciation and recognition from the interested quarters.

NOTICES & REVIEWS

(Manufacturers sending specimens and samples of their products for notice and review may please note that no notice is published of medical preparation and allied substances in this section.)

COTTON TAPES.

We are glad to receive from A. R. Enterprises, "Ponmah Buildings", Teppakulam, Trichinopoly three sample pieces of cotton tapes, of different designs and colours very suitable for curtains, etc.

INDIAN FOREST LEAFLETS.

We have received two copies of Indian Forest Leaflets Nos. 97 and 101, the former dealing with a preliminary note on cresol-formaldehyde and cresol-casein-formaldehyde adhesive for plywood while the latter dealing with notes on resistance of wood to corrosion by hot chemicals. Both these leaflets are published by Forest Research Institute, Dehra Dun, U.P.

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THE CO-OPERATIVE MOVEMENT.

THE fundamental problems, staggering into the face of the common men are shortage of food, cloth and shelter, which are the elementary necessaries of life. Hence, an immediate drive for production of more food and industrialisation so as to face up to the stupendous shortages is the desideratum of the day.

There is no disputing the fact that increased production is the need of the hour. But we must at the same time ensure that increased production, we plan in all the sectors of our economy, does not become a forbidden fruit to the vast millions of our common men. The economics of production must move in harmony with economics of distribution.

We strongly believe that "co-operative way" will be the best possible approach to this fundamental problem and that this system will be all the more effective and suitable in the context of present circumstances of acute shortage of our daily necessaries of life.

A co-operative institution, we know, is democratically managed and is never guided or goaded by individual or acquisitive greed. Hence it ensures equitable distribution and balanced production for use not for profit, affording at the same time opportunities for self-government.

Particularly in the field of distribution, these co-operatives can play a significant role indeed. As a part of anti-inflationary campaign, the government have decided to tighten up controls in all essential commodities. In this context co-operatives can play a more important part than ever. In the running of fair-price shops, the sale of mill cloth and the distribution of yarn co-operative consumers' societies can function to our maximum benefit and welfare.

Over and above its applicability to the exigencies of the present situation, co-operatives may be effectively applied to semi-long and long-term projects. In the post war era of acute house-shortage, co-operative housing may go a long way to solve our crisis. And schemes of joint farming may also be undertaken to our greatest advantage.

The movement thus seems to perfectly fit in with the peculiar needs and problems of modern India. We think, we should give it a fair trial in our country.

Current Topics

JUTE MANUFACTURING INDUSTRY AND RAW JUTE SUPPLIES.

Jute-Manufacturing Industry forms one of the major industries in India. The Government of India quite recently contemplated further expansion, in Bihar and Orissa. But this programme of expansion has to be finally curtailed owing to unavoidable reasons. The original plan of India Government was to set up four additional mills in Bihar and one each in Madras and Orissa. But as raw jute supplies are falling far short of our requirements, the Government have to brake its original drive for four new mills. The Government have, however, decided to implement only the project in Orissa where preliminary operations are already proceeding.

As a matter of fact, India Government cannot think in terms of new jute mills until India herself attains a certain measure of self-sufficiency in respect of her jute productions. The India Government have already taken steps to increase jute production in the dominion by 19,000 maunds and improved jute seeds had been distributed to jute growing provinces and 150,000 acres of additional land had been brought under jute cultivation.

Drive for increased jute production is, indeed, very laudable. Until the jute supply position shows appreciable improvement, India Government cannot think of multiplying jute mills in Indian Dominion.

INDO-GERMAN TRADE.

Concrete results have been achieved by Indo-German trade negotiations. According to the terms of their agreement, the two countries have agreed to issue import and export licenses for various goods and commodities. The Indian trade delegation to Germany reports that a number of German firms is already in a position to entertain firm orders from India for the manufacture of various types of textiles machinery to be delivered between 8 to 12 months. A few firms, it is understood, have promised early delivery of the following types of machines:—winding and finishing machines card clothing and card room machinery, bobbins, picking bands, ring frames, winding warping, weaving machines, twisting machinery, textiles calendering, screen printing machines, cropping, folding machines, bleaching and dyeing machinery.

For the reconstruction and rehabilitation of our national economy the machineries are indispensable. And India has to depend on foreign industrialised countries like Germany, U.S.A., U.K. for the necessary supplies of machinery goods. Considered from this standpoint Indo-German Trade Agreement is quite welcome and every endeavour should be made to perpetuate and consolidate these trade relations to our mutual and reciprocal advantage.

TEXTILE CONTROLS AND PRODUCTION DRIVE.

The chief defect of all controls is that they lay almost one-sided embhasis on equitable distribution of scarce goods and tend to ignore the vital need for increased production. Mr. S. C. Roy, President of the Bengal Millowners' Association did well, therefore, to remind the Government of India, in the course of his address at the recently held second quarterly meeting of the Association at Calcutta, that "What-

ever measure of step" it may adopt in connection with implementation of the textile control policy, the "primary consideration should be increased production." Mr. Roy admitted that there has been some improvement in this respect, thought it is not "so pronounced as to make us feel complacent over it." He also warned the Government that if it failed to "avoid the defects and pitfalls going with such control measures" the repercussions of such failure upon the industry, trade and the public would "prove to be too disastrous for any government however democratic and representative it may be." It is a heavy responsibility which the Government has shouldered when it has undertaken to control the production and distribution of textile goods, and the Government, will we hope steer clear of this defect and lay equal emphasis, on increased production along with control and other measures of equitable distribution.

COMMON TRADE PLAN WITH JAPAN.

Negotiations for resumption of private trade between Japan and Common Wealth countries were recently conducted in Tokyo, in which India also participated. And it is gratifying to note that a common trade plan has evolved out of their deliberations.

This trade plan is highly desirable from consideration of mutual benefit of both India and Japan. And India Government also are determined to do their best for promotion of Indo-Japanese trade to their reciprocal advantage. Accordingly they have appointed a Trade Commissioner to look after India's commercial interests in that country. The Indian businessmen, therefore, are asked to take fullest use of the services of this officer, who has instructions to afford them maximum facilities in establishing themselves in Japan and in cultivating new trade ties or restoring old ones.

The Government has, also under consideration the grant of suitable exchange facilities to Indian businessmen to set themselves up. The exchange position is unfortunately somewhat difficult but the Ministry of Commerce will be glad to consider sympathetically all applications that may be made to it.

The reasons for India Government's eagerness for trade contact with Japan are too obvious to need any further explanation. India, at present, is in dire need of capital equipment which Japan is in a position to supply in adequate quantities. And we are glad to learn that Japan also has been quite responsive in this regard. In connection with sterling talks, held in Tokyo, the Government of India have ascertained that Japan is in a position to supply the various types of Industrial machinery.

Japanese industrial capacity is, however, operated on a very restricted scale. But as Japanese prices compare favourably with world price and deliveriess are much earlier than those promised by other manufacturing countries, there is a very keen demand for her industrial production.

Indian businessmen, are therefore, advised to enter into immediate negotiations with Japanese manufacturers and place orders for the heavier types of machinery and plant before the end of December, 1948.

The types and categories of industrial machinery, Japan has agreed to supply, may be enumerated as follows:—

General Electrical Engineering:— Lamp caps for Electric lamps plant, containers for storage batteries plant, high tension insulators plant, heavy electrical power plant, radio components plant.

Machine tools:—Grinding machines, milling machines, hobbing machines, planning machines.

Special purpose machines:—Paper pins, safety pins, gem clips, syringe needles, pen nibs, band saw blades, back saw blades, spectacles frames.

Besides, Japan has agreed to supply Pottery machinery, machinery for glass, pharmaceutical, rayon, plywood dyestuff tanning, silk and wood industries, printing machinery and equipment, bicycle chains manufacturing plant, bicycle free wheels manufacturing plant, bicycle spoke manufacturing plant, latch needles manufacturing plant, sewing needles manufacturing plant, diesel engines manufacturing plant, machinery for the rubber manufacturing and paper manufacturing and paper industries, steam generating plant, hydro generating plant, diesel generating plant.

Adequate supplies of these heavy types of machinery and plant will remove one of the formidable obstacles of quick industrialisation and thus ensure a speedy progess and prosperity of India as a whole.

GOVERNMENT PLAN TO STEP UP STEEL PRODUCTION.

The total quantity of steel produced in India during the quarter July-Sep. 1948 was 211,050 tons. The production figures for the last two quarters of the year were 224,600 tons and 201,700 tons respectively. The decline in the two quarters is attributed to breakdown in scob machinery which has resumed normal production from September. The production for the year 1948 will be 825,000 tons, a figure which compares unfavourably with the production figure for 1947 (a year of universal under production) which was 868,580 tons.

With a view to resisting this downward production trend the Government are doing their utmost to step up production to its existing capacity namely 1260,000 tons per year and to assist Tatas and Scob in increasing their annual out put. But they are merely short-term measures. Besides these short-term measu Government are also taking prelimina measures for the speedy fulfilment their million ton production scheme. We are aware that three sets of foreign experts namely Kopper and Mackee U.S.A. and International Constructio Company are engaged in preparing alternative blue-prints for the scheme. Unle India increases per annual output, She w have to depend for her supplies on U. K and U.S.A., the need existing in Ind at present being 2½ million tons of stee or double the country's present produc tion and triple the actual production.

Due to this downward trend in pro duction Government have been confront ed with the problem of importing as muc steel as they can with the limited foreig exchange resources, available.

The sooner there is an end of this so of dependence on foreign supplies, th better for the interest of India.

CONCESSIONS TO INDUSTRY.

The Government of India recently an nounced the details of concessions whic they will implement to stimulate industria production in the country and which ar intended to serve as an anti-inflationar measure. The Government have sinc worked out the details of these conce sions. The details may be briefly state as follows:—

The rules regulating the allowanc of depreciation on plant and machiner for income-tax purposes are being libera ised. Commencing with the assessme for the year 1948-49 depreciation will b allowed on new buildings, plant an machinery set up on or after April 1948 double the existing rate for the first fi years and there after at the prescri rate subject to the condition that the tot

amount of depreciation does not exceed the original cost of the assets. For factories working on triple shift additional allowance will also be given up to the maximum of 100 per cent. of the normal.

In order to promote the installation of new machines it has been decided to give a further concession. If after a period of five years, the price of machinery falls below the original cost, the difference between the written down value of the asset and the corresponding value at the reduced price will be allowed as additional depreciation.

For new industrial undertakings of specified categories which commence production in India within a period of three years from April 1948, exemption of income-tax will be allowed for a period of five years on the profits up to the limit of six per cent. per annum of the capital employed in the undertaking. If in any particular case the period of three years within which production should commence proves inadequate, Government propose to consider the question of ex-extending it at the appropriate time.

Government also announced their intention of granting some relief in respect of customs duty on raw materials; plant and machinery to the extent to which this can be done without injury to Indian manufacturers of similar goods. It has been decided to reduce the present import duty of 10 per cent. on plant and machinery to 5 per cent., except in case of certain items where it is proposed to levy a protective duty. The reduction will apply to all items of machinery in the trade except electric motors, belting and steel belt lacing, grinding wheels and segments and certain items of textile machinery namely spinning rings, wire heels, pickers and bobbins.

As regards industrial raw materials, the entire duty on kraft paper, emery and synthetic grains used by the manufacturers of coated abrasives will be refunded. The import duty on cotton yarn will be abolished and the duty on rough lens blocks unwrought optical glass in blocks moulds and sheaths and spectacles crown short glass will be reduced from 30 per cent. advalorem to 20 per cent. advalorem The existing duties on iron, and steel scrapt, ball clay and graphite electrodes will be abolished. The possibility of reducing the duty on certain other items is under examination. With regards to the scheme for the limitation of the dividends of public companies details are being worked out and an ordinance amending the Indian Companies Act and embodying these decisions will be issued in the course of the next week.

It is Government's intention to limit the present scheme to a period of 2 years from the date of ordinance. 'Legislation to implement these decisions relating to income-tax will be undertaken in the budget session of the Legislature.

The orders giving effect to the proposed changes in customs duty will also be issued.

Concessions in these forms will, we hope, provide incentive to business enterprises and thus stimulate industrial production in India. The Government has exercised a very admirable sense of proportion and judgment, in apportioning concessions to different industries.

PROSPECTS OF INDO-DANISH TRADE.

The Danish Trade Commissioner, Toyberg Fradzen in a recent Press interview revealed that Denmark is now in a position to supply India's urgent requirements of capital goods and technical equipment. Denmark in her turn expects from India many vital items of valuable produce for industrial and agricultural purposes.

Although Denmark is a small country, she has sufficiently improved her position through trade agreements and is now in a position to supply a wide range of industrial machinery on favourable delivery terms.

The Danish Trade Commissioner further revealed that Danish technical assistance could be made available for such aspects of India's economic life as development of shipbuilding, fisheries, dairy farming, cement manufacturing, certain chemical industries and the pharmaceutical industry and prefabricated housing. Considerable interest has been evinced by Danish Engineering circles in some of the ambitious multipurpose dam projects of the Government of India. Besides, Denmark is ready to afford all possible facilities to Indian students for post graduate work. During 1947 exports from Denmark to India were valued at 74 lakhs, as against the import of Indian goods worth Rs. 53 lakhs. The trade balance was thus unfavourable to India.

During first seven months of 1948 the trade balance has obviously changed in India's favour. Total exports from Denmark during these months are valued at 55 lakhs while imports of Indian goods are worth 90 lakhs.

A sweet trade relationship, will, we hope, grow between India and Denmark to their reciprocal advantage and India may have thus an excellent opportunity of fulfilling her vital requirements, e.g. capital goods and technical personnel.

THE PLASTIC INDUSTRY.

TO-DAY the comment is often heard that we are on the threshold of the "Age of Plastics," and such a sweeping statement naturally awakens curiosity as to the nature and possibilities of the substances. In a general way most people probably have some idea of what a plastic is. Bakelite, one of the pioneer plastics, has now become practically a household word; but the response to the word "plastic" is generally only a mental picture of some minor articles, as ash-tray, fountain pen barrel, etc. This scarcely justifies such a comprehensive statement as "a Plastics Age is on the way." A little deeper enquiry would, however, bring conviction that there are excellent grounds for the statement. Indeed, plastics of various kinds have already created what amounts to a minor revolution in our lives, and show every sign of transforming them completely in the near future.

The catalogues of the principal manufacturers of plastics give a sharp, but quite a pleasing shock. The products, which have no limit to their range, seem invariably to be ones of beauty and colour. An article should like what it is. Clean, straight or flowing lines or curves, smooth surfaces, absence of so-called decorative additions these are the attributes underlying the beauty of modern craftsmanship. In a word—stream-lining. Now plastics are largely moulded material and therefore clean, simple, non-re-entrant designs are almost necessary. It is so difficult as to be practically impossible to produce complicated, fussy, or over-decorative designs from such materials. The contrast between the old and the new is well illustrated by a comparison of an out-moded type of telephone instrument (heavy, ugly, cumbrous and frequently ornate, with protruding knobs and edges), with a modern hand-set in coloured plastic. The adjective coloured is important, too. Early plastic were usually brown or black as the mate rials themselves were dark, and would nc dye readily. Modern plastics know n such limitations. Articles are now prc duced in every colour imaginable. The may be jet black and opaque, or clear a crystal.

In this article an attempt is made to giv some idea of the immense field in whic plastics are serving mankind. First, how ever, it is necessary to consider wha plastics are, for this to be fully understoo a small amount of chemical theory i required. Preliminary to this, is glimps o that position to be dealt with later, th place of plastics in the world to-day, ma be useful.

PROPERTIES IN COMMON.

All plastic materials whether syntheti resins or otherwise, have certain prope ties in common. The outstanding featur is that they are all thermoplastic at som stage. It is only after a heating process tha the diverging properties begin to develop The thermosetting resins as phenol-for maldehyde resin or urea-formaldehyd resins when heated at first become sof

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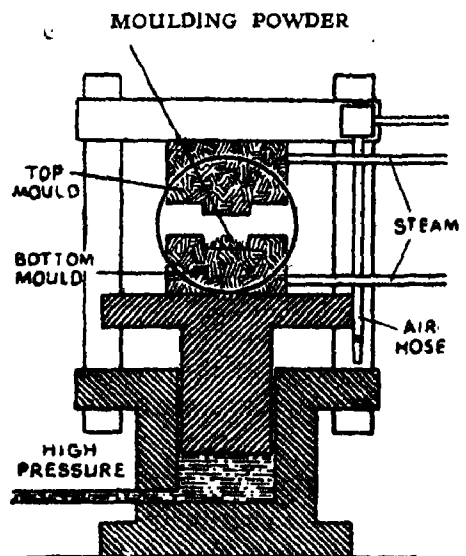

1. An Upstroke Hydraulic Press.

just like all the others. When the heating has been continued for a sufficient period they change to a rigid rock-like product which can no longer be softened. In sharp contrast, the other materials can only harden when cooled, but can thereafter be softened again.

It is this common property of thermoplasticity which is responsible for the development of plastics, for it enables the materials to be used by mass production methods. In the case of setting resins, the change to the rigid condition can be accelerated so as to take place within a few seconds if desired. In practice, what happens is that the resin in the form of a powder is placed in a mould, put into a press, and subjected to heat and pressure. The heat softens the resin and the pressure forces it to take up the shape of the mould. In a few seconds it has become rigid and can then be ejected immediately as a finished reproduction of the mould.

Another feature they have in common is that each type has a large and complex molecular structure. The synthetic resins start from simple chemical entities, most of them quite familiar chemicals. They are then caused to build up to the resinous condition, when they acquire the desirable physical properties. The process in most cases is known as polymerization. In the case of the cellulose plastics the long structure already exists having been bulk by nature.

Another feature which all plastics have in common is the ability to form strong films either from solutions in solvents or by mechanical processes. This accounts for their prominence in the industries where coatings are involved, e.g. paint, artificial leather, etc.

SOURCES OF PLASTICS.

There is a surprisingly wide range of chemical raw materials used in the manufacture of resins. Some of the most important of these are alcohol, acetic acid, formaldehyde, butyraldehyde, ethylene dichloride, benzol, phenol, cresols, acetone, acetylene, urea, various inorganic acids, cotton linters and wood pulp. This list is again supplemented with many plasticisers which are required for plastics. Often it is the plasticisers rather than the resin components which become the determining factor in the availability of the final plastic.

DEFINITION OF PLASTICS.

In view of the great potential importance of the plastics industry, there should be a much wider knowledge of plastics. There is a general desire for definitions concerning plastics generally. The term itself is vague and ambiguous and consequently somewhat misleading. Comparatively few materials show any obvious outward sign of being plastic. After all, the general conception of "plastic" is something soft and yielding. In this respect none of the commercial materials conform. Certainly the products with which most people are accustomed—hard mouldings in no way convey any impression of plastic character.

A plastic product is one which has been formed under the action of heat and pressure, and which has taken on a permanent shape when these agencies were withdrawn.

Let us go in detail with these materials to give some insight of the plastic industry.

BASIC COMPOUNDING MATERIALS.

Binders, fillers, plasticizers, dyes lubricants, and solvents are among the various basic substances that are used in the production of plastic moulding materials. Such a listing of components is chemically inaccurate, since it is by no means complete, and different substance can serve various purposes in the formula

tion. However, only those basic substances which affect final properties will be briefly discussed. This will fix in the design engineer's mind the reasons for their use in the formulation and give him some idea of how these substances affect the engineering properties of the plastic material.

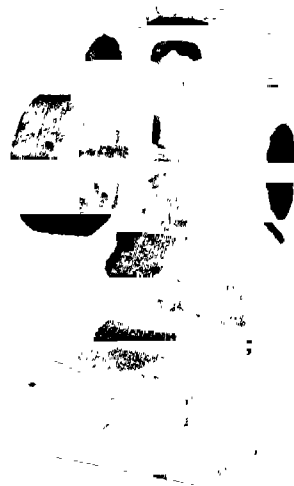
BINDERS.

Synthetic resins, cellulose compounds, and protein compounds are usually considered as binders.

The basic materials for synthetic resins may be said to be coal, air, cellulose, limestone, petroleum, salt, and water. From these basic raws are obtained urea, nitric acid, phenol, acetylene, phthallic anyhydride, ethylene, methanol, formaldehyde, cellulose nitrate, ethyl cellulose and many others.

The synthetic resins can be used with or without fillers, but are usually compounded with fillers. The resins are available in liquid form for impregnating paper or fabric or, for use in varnishes, adhesives, and surface coatings, and as a bond in grinding wheels and the like.

Phenol resins may be obtained as by-product of the distillation of coal. Phenol is separated from the anthracene oils by treatment with caustic soda. Formaldehyde is obtained from the oxidation of methanol or from wood alchol.

Cellulose binders are obtainable from two sources: cotton linters or wood pulp. These binders are treated with nitric acid and then mechanically and chemically washed. The raw materials are synthesized into cellulose acetate resin. The cellulose resins are mixed with a plasticizer which is added in some cases to increase flow properties for ease of moulding, added in others to increase impact strength. These plasticizers include sulfonamides, phthalyl glycolates, triphenyl phosphates. They have a marked effect on physical properties. Generally, t[illegible] and compressive properties decreas[illegible] increasing plasticizer content. As a r[illegible] the grades of plastic compounded for[illegible] of flow will show minium strength [illegible]perties and vice versa.

2. Crank Pellating Press.

FILLERS.

Added to resins, fillers make a [illegible] range of properties possible. Va[illegible] fillers may be compounded with the [illegible] to obtain special high electrical, che[illegible] and impact resistance or to im[illegible] mouldability. Fillers are especially [illegible]portant in the phenolic materials [illegible] make possible the hundreds of for[illegible]tions offered by materials manufact[illegible]

Typical fillers for phenolics in[illegible] wood flour, cotton, fabric, gra[illegible] asbestos, mica. Urea resins are ge[illegible]ly compounded with purified wood [illegible]lose (alpha-cellulose). The effect of [illegible] on properties may be easily seen by r[illegible]ence to the chart on moulded therm[illegible]ting plastics which also gives an id[illegible] the applications and limitations of va[illegible] types of filled materials.

EFFECTS OF FILLERS.

Wood flour is the most common [illegible] used in phenolic materials. This fille[illegible]

a low specific gravity, therefore the number of mouldings per pound is higher. Other advantages obtained by its use are good mouldability, good appearance of the moulder surface, low heat conductivity. However, wood-filled phenolics have only fair impact strength and are subject to shrinkage in service. Applications of the general-purpose wood-filled phenolics are limited only by strength, heat resistance, and colours available.

Cotton fillers improve impact strength and increase impact resistance. Though for higher impact strength rag filler is generally required, cotton flock is widely used for parts requiring medium impact strength. Parts made of cotton-filled phenolic can be easily buffed and polished and can be tableted easily, an important factor in maintaining high hour by production rates in compression moulding operations.

Rag fillers increase impact strength, this increase depending on the length and type of fiber. Increase in strength is obtained at the expense of some other properties, notably poor surface finish and poor machinability. Rag-filled phenolic has a relatively poor flow.

When heat resistance is paramount in the moulded part, asbestos fillers are compounded with the phenolic resin. Asbestos fillers also impart a good degree of water resistance, as well as resistance to most acids. These fillers retard somewhat the moulding operation because of reduced flow. Another disadvantage is the high specific gravity, which of course proportionately reduces the output of parts per pound of moulding material.

Mica is used to impart good electrical resistance; it is the filler for low-loss compounds with excellent insulating qualities. Poor machinability is a characteristic. Because of brittleness, parts moulded of mica-filled compounds cannot be drilled.

Graphite fillers, generally used in combination with wood flour, asbestos, and rag, impart acid resistance and improve moulding qualities because the graphite serves as lubricant. However, poor heat conductivity is noted. This filler is used in phenolics for moulding of bearings castor wheels, slides, and the like.

Other fillers, of course, are available. For instance, to increase the yield per pound of moulded parts, a low specific gravity substance, silica in diatomaceous form, can be used. This substance as a filler will give fair electrical properties, fairly low water absorption. Barium sulphate fillers add chemical resistance. Talc imparts lubricating qualities.

CLASSIFICATION.

Plastics are so varied in composition that it is desirable, for the sake of clarity, to divide them into sections. The method adopted here is quite general and relates to two broad divisions dependent on a simple physical distinction. This distinction finds its echo in the methods of processing the two divisions.

1. Those which are softened, moulded or shaped by pressure, with or without heat, and whose finished hardened shape can be re-softened by heat and re-moulded. Such plastics are the heat-softening type and are generally called thermo-plastics.
2. Those which, in their original condition, flow and can be moulded shape remains rigid and hard when heated. Such plastics are the heat-hardening type and are generally called thermo-setting plastics.

The best known under each of these divisions are:—

Thermo-plastics.	Thermo-setting Plastics.
Cellulose compounds	Phenol-formaldehyde resins.
Bitumen	Urea-formaldehyde resins.
Casein	Melamine-formaldehyde resins.
"Styrene" resins	Soya-phenol-formaldehyde resin.
"Vinyl" resins	
"Acrylir" resins	
Synthetic rubbers	

PLASTIC PLANT AND EQUIPMENT.

In producing resins, moulding compounds, laminates, surface finishes etc., the following equipments are required:—

1. Mixing and Kneading Machines.
2. Hydraulic filter presses.
3. Converting rolls.
4. Hydraulic block or caking presses.
5. Sheeting planers.
6. Seasoning chambers or vaults.
7. Hydraulic plate polishing presses.
8. Stuffers or extruding machines for rods and tubes, etc.
9. Grinders for moulding powders.
10. Resin kettles, steam jacketed.
11. Vacuum dryers.
12. Rolling mills.
13. Moulds.
14. Injection moulding.
15. Compression moulding.
16. Hobb and Hobbing.
17. Flash type mould.

THERMO-PLASTICS.

Among the thermo-plastic substances those which are more or less important are briefly described here owing to limited space at our disposal.

CASEIN PLASTIC.

These comprise a fairly wide range of materials made from cellulose materials, such as cotton, paper, wood, etc., by interaction with chemicals.

CELLULOSE NITRATE.

Cellulose nitrates better known as celluloid, is the oldest of the plastics. It is manufactured in the following ways:—

Purified cotton linters are stirred with a mixture of nitric and sulphuric acids: The cellulose of the cotton combines with the nitric acid forming cellulose nitrate with the liberation of water which is absorbed by the sulphuric acid. The resulting cellulose nitrate pulp, after removal of excess acid, is stabilished by boiling with water and separated in a centrifuge. At this stage the cellulose nitrate still retains its "cottony" or fibrous form. To produce from this celluloid plastic, it is first treated with alcohol and then kneaded with camphor, rolled and calendered into sheets: consideration of a number of sheets under pressure results in the production of solid blocks. Without the addition of dyes or pigments, celluloid is nearly water white and transparent, but by such addition it can be made coloured and transparent, coloured and opaque and or of variegated colours at will.

8. Rotary Pellating Press.

CELLULOSE ACETATE.

Chemically, cellulose acetate has been known almost as long as celluloid; it was then used not as a mouldable plastic but as a dope for producing lacquers for aircraft. In recent years sheets and moulding powders are manufactured from this material. The great attractiveness of

acetate lies in the fact that it is non-inflammable, compared with celluloid, and perfectly safe. Otherwise, in appearance, strength and mouldability there is little to choose between the two materials.

Cellulose acetate is manufactured in a manner closely resembling that of celluloid. The chief raw material is cellulose, and since cotton is the present form of cellulose it is almost always employed. Some success has been obtained by using other forms of cellulose, e.g. wood pulp and even straw, but especial purifying methods must be adopted, otherwise the quality of the finished cellulose acetate is affected.

Cellulose is treated with acetic acid and a derivative of acetic acid called acetic anhydride. The acetate resulting from this reaction is in a syrupy form, from which a white powdery or flaky material is obtained. This is then dissolved in a mixer with organic solvents and plasticisers, and a plastic dough is then rolled on hot rollers to reduce the volatile solvents and used to make sheets, tubes, rods or moulding powder. For the production of tubes and rods the dough is extruded directly. Sheets are made by the slicing of solid blocks (up to 8 in. thick), obtained by consolidating the rolled dough in hydraulic presses and then cooling.

ACRYLIC RESINS.

These important plastics are derived from acrylic acid. It is prepared from the liquid acetone. For this purpose the acetone is converted into acetone cyanohydrin is then converted to alpha-hydroxisobutryc acid water by sulphuric acid and an alcohol. The monomeric ester of methacrylic acid is purified by fractionation and subsequently polymerised to the solid resin.

The monomer may be cast in moulds and polymerised to its final shape as sheets, rods, blocks, and various forms, or it may be produced in the form of granules. If it is allowed to polymerise while suspended in water in the form of large droplets, a granular product results. An aqueous emulsion of the monomer may be formed by using an emulsifying agent such as ammonium oleate. If polymerisation is carried out on the emulsified monomer, a product results which may be used as a coating. The individual particles of the polymer will be found to coalesce on evaporation of the water, having a clear resistant tough film. If the substance is polymerised while in solution, a satisfactory dope results. These dopes are usually produced by dissolving the monomer in a suitable solvent and heating in the presence of a catalyst.

Moulding powders for injection and for compression moulding may be produced in a variety of ways. Use may be made of the production of the granular form of the polymer resulting when the monomer is polymerised under water; or the polymer produced in a finely divided state in aqueous emulsion, or in solution in organic solvents may be precipitated by an agent such as methyl alcohol or acetone, and washed and dried. If the polymerisation is effected with the monomer dissolved in a liquid in which the polymer is insoluble, a finely divided precipitate of the polymer will result.

In addition to the above described process of producing granular or powder forms of the polymer, cast sheets may be pulverised for the preparation of moulding powders, or the solvent may be removed from resin solution such as the dopes, and the remaining solid disintegrated.

Powders produced by any of these methods may then be mixed with various additional substances such as fillers, organic or inorganic pigments, and plasticisers. Because of its beautiful crystal clarity, dyes rather than pigments are

usually used in these articles, and fillers and pigments are omitted. The articles may be dyed after they are finished, but the thermo-plastic nature of the material makes it more practical and convenient to add the dyes before polymerisation. Plasticizers or softening agents such as ethyl phthalate or tricrysyl phosphate may be used, and the resin may be modified by the addition of cellulose esters or ethers, rubber or guttapercha. Substance such as clay, soot, talc, or sulphur may be used as fillers.

If the moulds or casting surfaces are highly polished, no further polishing or finishing is required on the finished pieces.

Casting syrup may be prepared by dissolving the prepared polymeric acrylic ester in a portion of a monomer of a like ester, the proportion of 5 to 10 % of the polymer in the solution being suitable.

Being thermoplastic, acrylic resins may be satisfactorily extruded. A modified granular form is appropriate for this method of forming.

CASEIN PLASTIC.

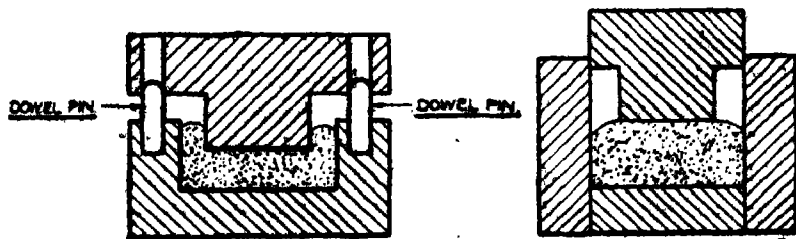
Casein ranks among the most outstanding of the colour plastics and is widely used in the manufacture of buttons, cutlery, combs, spectacle frames, umbrella handles, fancy goods, electrical units, etc. In all respects it works like horn and ivory, and it can be turned, drilled, polished, stamped, moulded, and engraved. Now it is playing an important part in this present war, and it ranks among the few of the pioneer plastics which also saw service in the world war of 1914-18.

Casein is insoluble in water, alcohol, and most neutral organic solvents, and it is not readily wetted by water or aqueous solutions unless it contains traces of moisture. Strong acid solutions hydrolyse casein, but cold, dilute, inorganic acids have no action on it, although it is soluble in them and in the common organic acids, acetic, formic and lactic. Casein dissolves readily in dilute, aqueous solutions of alkaline hydroxides, and in dilute solusolutions of their soluble carbonates and bicarbonates.

Many methods have been devised for precipitating casein from milk, but so far as its commercial use is concerned, two general methods are in use: (a) precipitation by acid, (b) co-agulation by the rennet enzyme.

This latter acts on the calcium caseinate of milk, causing the separation of a jelly-like curd. As acidification methods are not employed in the production of casein for the plastic industry, attention will be confined in this article to the dry process in which rennet is employed.

PRECIPITATION OF CASEIN BY RENNET.

In this process the milk is collected under clean, antiseptic conditions and is processed as such as possible after collection. Care is taken to remove the cream as completely as possible, the skimmed milk is run into vats where rennet is added during continuous stirring. The stirring is so adjusted that the grains of

4. Flash Type Mould & Positive Mould.

curd formed are of the size of washed three times with warm water, drained, pressed, and dried in trays at 110° to 115°F.

The casein thus produced should be in the form of clean, translucent, slightly yellowish grains, with only a very slight smell and taste.

Produced and boiled with water for one minute, the casein granules should swell evenly but not coagulate. The casein thus obtained is then subjected to the next process.

PRODUCTION OF CASEIN PLASTIC.

The transformation of casein grains by mastication under the influence of heat and pressure in the presence of moisture into a homogeneous plastic mass, which acquires hard, horn-like properties after treatment with formaldehyde, forms the basis of casein plastics manufacture.

Casein should be kept, but not for long periods, in a dry, well ventilated store until ready for grinding. The operation is preceded by coarse sieving, after which the casein travels to a kibbling machine where it travels between two grooved rollers for preliminary reduction followed by grinding in a four-high roller mill. The product from the mill is passed through a purifier in which it is sifted or graded, and freed from light particles. The cleaned, sifted material, which should be of such fineness that all of it will pass through a 48-mesh sieve but tail on an 80-mesh, is finally passed through a magnetic separator.

The mixing takes place in a dough mixer, and normally to 100 kilos of casein, containing 10 per cent. moisture, are added 26 kilos of water. The water must be free from iron salts, and should either be freshly distilled or softened. For colouring purposes, where such is necessary, acid dyes are added, and these should be as fast to light as possible. The water is added to the mixer in the form of a spray, 15 minutes being occupied in the case of a charge of the size indicated, and the mixing continued thereafter for an hour.

Many additions to mixings have been suggested as aids to softening and transparency, only glycerine to the extent of 2 per cent. of the weight of the casein, is desirable, but tricresyl phosphate and methyl-diphenylamine aid the plasticizing and add translucency.

The mixture of casein, water, etc. is now ready for extraction, an operation performed in a horizontal screw extrusion press consisting essentially of a 4-6 inches diameter revolving screw fitted in a jacketted body with a feed hole at the back end, and a heated nozzle at the front. Over the feed hole is a hopper holding the moist casein, with a simple stirring and feed-regulating device. The body of the machine which surrounds the screw is fitted with two separate jackets provided with steam and cold water supplies. At the front of the screw a perforated steel grid is fitted behind a nozzle, which can be changed to give various sized rods or fitted with a mandrel to produce tube.

The most important item in casein plastic plant is the stuffer (i.e. the extrusion press). This conveys the casein as fed into it in the direction of the orifice during which time the mass is compressed masticated and made uniform, and elects ir as a rod free from occlusions or impurities. The spiral conveyor tapers proportionately to the compressibility of the materials. The rear and is water-jacketed and cold water prevents sticking of the particles or formation of air pockets. The forward end and the steel sieve are warmed, and the nozzle is steam or electrically heated so that there is flow of the homogenous mass. At this stage the material is soft, like rubber, and then gradually

hardens to a firm material as it is extruded, and is conveyed away, cut to size and cooled in water.

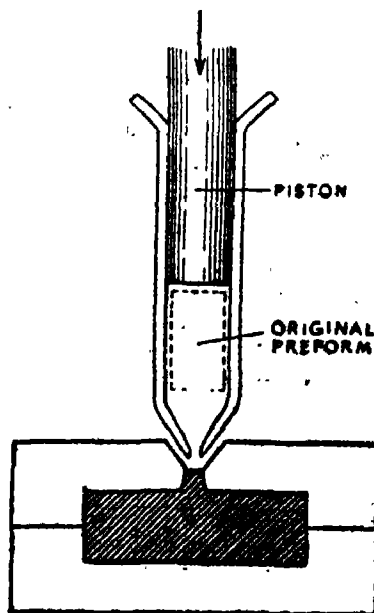
In front of each extrusion machine is a table covered in a belt which travels at a rather higher speed than that of the extruded rod. The rods are thus under slight tension so that they are kept straight.

Mottled material resembling horn, tortoiseshell, etc., may be made either by using a doble-screw type of extruder with a single nozzle, i.e. two separate mixings are thus fed into each screw, and, having been plasticised separately, meet and are extruded together through the nozzle, or alternatively a small quantity of coloured material may be made and then pressed into a sheet direct from the powder. This sheet is cut up into pieces of about ⅛ inch cube, dried somewhat, and added to a suitably coloured mixing base. The mixture is then extruded in the ordinary way.

For sheets two methods are used; the mixed coloured casein powder is spread in a suitably shaped mould and pressed, or the rods obtained by extrusion are cut into uniform lengths of suitable size: these are placed in moulds made of duralumin. The moulds are pressed in a multiple platen hydraulic press. The platens are heated to 180° to 190°F and a pressure of about 600 lbs. per sq. in. applied for 3 minutes followed by application of full pressure upto 2 tons per sq. in. for a further 3 minutes. Cooling by 6 minutes while the pressure is maintained. On removal from the press the sheets are soft, quickly dry in the air and become hard.

HARDENING CASEIN PLASTICS.

The case in plastic is hardened and rendered more or less waterproof by treatment with formalin. For this purpose 40 per cent. formaldehyde is diluted to 5-6 per cent. strength, weaker for thin sheets and stronger for thick sheets and rods. The treatment is carried out in crick tanks lined with cement and through these the solution is kept in circulation by pumps, temperature maintained at about 65°F, the strength of the solution being maintained by a suitable addition to the solution of formaldehyde from day to day. The treatment varies from 2 days in the case of 2 m.m. sheets to 2 months for rods of 25 m.m. diameter. The material is now removed and washed with water to free it from adhering formaldehyde. During this curing the formaldehyde gradually soaks through the casein and the change which occurs, is said to be in the nature of a consideration.

Various alternative methods of treating casein for the production of hardened masses, plastics, etc. have been proposed of which the following may be mentioned: Casein is mixed with 5 per cent. water and triethanolamine or a mixture of the ethanolamines; casein is mixed with

8. Transfer Moulding.

glyoxal or one of its homologues; alkaline solutions of casein containing a phenol are treated with an aldehyde in the presence of ammonia. Hardening of casein plastic masses will take place during hot pressing *if the mass contains* compounds such as methyl-ureas and urethane which, at the temperatures employed yield formaldehyde and difficultly volatile substances which improve the properties.

DRYING AND AFTER TREATMENT.

The drying operation after formaldehyde treatment calls for little comment, but it is important to realize that casein plastics easily deform and shrink in drying. Rotation of casein rods while drying and suspension in a drying chamber are two methods practised in U.S.A. to prevent this shrinkage.

The usual practice is to take the washed crates containing the treated rods or slabs and place them in a drying oven where they are subjected to a current of warm air to 80° to 115°F, the operation taking several days, to counteract the warping which occurs during drying, rods are straightened by being softened in warm water and subsequently allowed to cool in wooden trays. For the sheets the practice is to put them, in a press, where they are subjected to a pressure of about 250 lbs. per sq. in. while being maintained at a temperature of 190°F.

Sheets and rods are polished in the usual type of polishing machine. The finished material can be easily turned and drilled and made into spectacle frames, buttons, umbrella handles and fountain pens.

POLYSTYRENE PLASTIC.

Polystyrene is prepared by the polymerisation of styrene or vinyl benzene, obtained by splitting hydrogen from ethyl benzene. The preparation of styrene from ethyl benzene may be effected in various ways, perhaps the most important being the heating of the ethyl benzene to a temperature of 500°C to 800°C in the presence of an inert gas, with a catalyst such as an oxide of calcium, manganese, etc. The splitting up in this way of a benzene compound with an aliphatic side chain to give styrol and hydrogen is reversible, hence the hydrogen must be removed. To this end, a dehydrogenating agent such as sulphur is usually added to the ethyl benzene.

POLYVINYL PLASTICS.

Styrene contains the group of atoms $-CH=CH_2$, and it is the presence of the double bond, or unsaturated linkage, which makes it undergo polymerization so readily. This group $-CH=CH_2$ is called the Vinyl group, and gives the name to the important plastics we are about to consider. The principal binders in this group are polyvinyl chloride and polyvinyl acetate. The basic substance in each case is acetylene. Treated with acetic acid, this gives a liquid, vinyl acetate, which polymerizes to polyvinyl acetate, which is a hard, clear resin.

Polyvinyl chloride is similarly made, except that hydrochloric acid is used instead of acetic acid. (Also, mixtures of these two substances are often used). These plastics are very resistant to chemical action, and have excellent electrical properties, particularly as sheathings for electric cables.

BITUMEN.

Bitumen, asphalt, pitches and similar materials form a small yet important branch of the plastics industry, being employed in the electrical industry where cheapness, backed by reasonably good dielectric strength, is important. The important point to realise about these composition is that not only are they thermoplastic, but they are actu-

-ally moulded in cold moulds. They were originally conceived to provide a material for electrical construction in addition to ebonite, mica and porcelain, and although the electrical properties are well below these, yet they serve admirably for many purposes.

The composition is generally made up by melting bitumen and mixing with asbestos and silica dust. The hot mixture resembles dough or putty and while in this condition is placed in a cold mould, when it is pressed into the desired shape. On cooling the moulded shape is hard and reasonably strong. Terminal blocks, panels, transmission parts, and overhead line insulators are widely produced for the electrical industry, and battery boxes and accumulator cases for the motor-car industry; bitumen mouldings are very resistant to sulphuric acid:

Tensile strength
about ½ ton per sq. in.
Cross break strenth
about 1⅓ ton per sq. in.

SHELLAC PLASTICS.

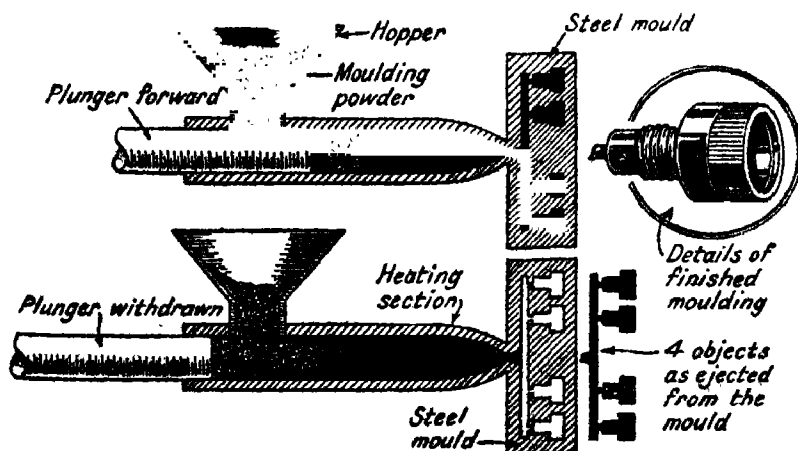
Shellac compositions are now a days widely used for plastic moulds. They are capable of being produced at a faster rate than shellac itself by the hot and cold process and are much more heat resistant To prepare this shellac is treated with formaldehyde and urea in the manner described below.

When shellac is heated with formalin at 120°C washed in boiling water, it is found to contain 4-6 per cent. formaldedehyde and is softer than shellac itself. But when such a product is reacted with urea and mixed with fillers, etc. a moulding composition is obtained.

The actual procedure for the preparation of the moulding powder is as follows:—

Shellac, formaldehyde, urea, wood flour, calcium stearate, pigment and rectified spirit are digested in a steam-jecketed still, by using steam at 10 lbs. pressure in the jacket for 4 hours, the alcohol being distilled and recovered through a water-cooled condenser. Towards end of the distillation, vacuum is employed to effect a more complete recovery.

The proportions of the different materials employed for the preparation of the moulding powder are:—

Lac	50.0	lbs.
Formalin (30-35% formaldehyde)	25.0	,,
Urea	7.5	,,

8. Simple Diagram Showing Essential Features of Injection Moulding.

Calcium stearate	1.25 lbs.
Pigment (Brown, black or red)	2.5 „
Wood flour	50 „
Rectified spirit	12.5 gallons.

(out of which about 10 gallons may be recovered).

The pasty mass in the still is taken out and kneaded in a mixing machine of the "Universal" type under vacuum, the alcohol vapours being condensed and collected. The dried lumps of the composition are powdered to 60-mesh in a disintegrator.

The powder is finally dried at 90°-95°C. for 1-2 hours until the batch sample shows non-blistering and free-flowing properties when moulded at 120°-750°C. and ½ to 2 minutes in the press. Thick-walled articles from heavily built moulds require a lower temperature than thin-walled ones produced in light mould.

The moulds can be prepared of mild steel when the moulding is not intricate and when only a few hundreds of articles are required. For complicated mouldings or, if these are to be manufactured in thousands, hardened steel moulds are necessary. The polish of the mould determines the gloss of the moulded surface of the article.

Shellac moulded articles prepared as above can be polished, if necessary, on a buffing wheel or sprayed with lacquers, to improve their appearance.

The heat and water resistance of the moulded products are greatly improved by baking them for several hours at 60°C. and then gradually increasing the temperature of the baking oven to 120°C.

THERMO-SETTING PLASTICS.

These synthetic compounds are more widely known to the public than any other plastic compound, because of widespread publicity and the fact that so many general utility objects made from them reach the average home. As often as not they are all termed by the generic name of bakelite, although this name is a trade name belonging to the Bakelite Corporation of America and of Bakelite Ltd. of Great Britain. There are now many manufacturers of similar plastics, but the name of Bakelite will always be remembered as the first of a very remarkable series of synthetic plastic of phenol-formaldehyde type.

The thermo-setting type of synthetic resins are generally divided into two sections: —

(1) Phenol-formaldehyde resin type. These comprise resins made from pure phenol (carbolic acid) and other phenolic bodies also extracted from coal tar.

(2) Urea-formaldehyde synthetic resins. These comprise those made from urea itself or other organic compounds which, like urea, contain an "amino" or ammonia group.

PHENOL-FORMALDEHYDE RESIN.

In preparing the resins, phenol and formaldehyde are allowed to condense in a steam-jacketed chromium lined or nickel reaction kettle under nonrefluxing conditions.

Either acid catalysts (usually sulphuric acid) or alkaline cataylysts (usually ammonia or hexamethylenetetramine) may be used, but condensation will take place even in the absence of a catalyst. After the reaction has started, the heat of the reaction becomes so great that cold water is substituted for the steam in the kettle jacket to control the reaction.

The molecular ratio of 1: 1 phenol to formaldehyde, is used to produce a thermosetting moulding compound. If a greater proportion of phenol is employed, a permanently soluble and fusible, though hard, resin may be obtained. This is suitable for use as varnishes and lacquers.

In the presence of an acid catalyst the reaction tends to go to completion rapidly. With such catalyst a low percentage of formaldehyde will form permanently fusible or non-polymerising resins which may be dehydrated easily by heating. These resins may be converted to the infusible type by reheating with more formaldehyde or by adding a formaldehyde derivative such as paraformaldehyde or hexamethylenetetramine.

The formaldehyde employed in the reaction may be either the 37 per cent. aqueous solution known as formalin or the paraformaldehyde.

7. **Typical Area-formaldehyde Mouldings.**

When equal proportion of formaldehyde solution and phenol are used the mixture forms two layers after a few hours' heating. The lower layer consists of the syrupy condensation product and the upper one of water. The water may by removed by decantation and the lower layer heated (usually in vacuum) to eliminate as much of the remaining water as possible. The condensation syrup is then run quickly into pans to cool to solid resin. Thorough elimination of the water results in the formation of a clear transparent product.

While the resin is still in the reaction kettle care should be taken to keep the walls and surface of the container free from a crust of hardened resin which will tend to insulate the rest of the contents, and may interfere with the handling of the liquid portion.

Tests to determine whether the reaction is complete consist in determining the viscocity of samples of the resin at frequent intervals. The hardened resin is tested for solubility and for polymerisation time at various temperatures.

In the manufacture of moulding powders, the hardened resin is taken from the pans and broken up into large lumps and placed in a crusher, where the size of the pieces is reduced. These pieces are further ground in a high-speed hammer mill until they pass a 200-mesh screen. The powder is then blended with a small amount of lubricant (calcium stearate) in a ribbon blender and, if an acid catalyst was used, a small percentage of hexamethylenetetramine to act as an activator. The soluble, fusible, hard resin in the cooling pans often is called the A-stage resin, and the final moulded and infusible mass is called the C-stage resin.

To produce different grades of moulding powder, the basic powder is placed in a ribbon blender and mixed with plasticizers, additional lubricant, pigments it desired, and filler, usually wood flour. Mineral fillers such as asbestos, mica, and talc are also used. The blended material may be moulded as such, or may be prepared in various size granulations or in pellet form. It may be passed between heated rolls to rigid sheet. This can be fed into a low-speed cutting machine and cut to the desired granulation, screened,

and the oversize particles passed through the cutter again. A final blending it often made with other batches of the material or any other modifying substance.

A formula for a typical moulding compound:—

Phenol	42 lbs.
Formaldehyde	27 lbs.
Sulphuric acid	9.1 lbs.
Wood flour	52 lbs.
Hexamethylenetetramine	3.7 lbs.
Black nigrosin dye	1.3 lbs.
Calcium stearate	0.7 lbs.

CAST PHENOLIC RESINS.

The phenolic synthetic resin employed for casting is not produced in exactly the same way as that described for moulding powder manufacture.

The liquid phenolic condensation products are prepared by reacting boiling phenol and formaldehyde, usually in equimolecular proportions, in the presence of a catalyst e.g. ammonia, fixed alkalies of acids, until the clear mixture moulded to a water-insoluble product. On cooling, the liquid resin settles because of its higher gravity, having a supernatant water layer. Since such resins have little affinity for water they are called hydropholic.

By varying the conditions of the initial condensation reaction between phenol and formaldehyde, it is possible to prevent the separation of the resin phase even after acidification and cooling. To accomplish this, the manufacturer uses first relatively high molecular ratio of formaldehyde. In practice it is usually two parts by weight of 37 per cent. formaldehyde to one part of phenol. Secondly is the amount of fixed alkali used as a catalyst to cause the actual resinification between the phenol and the formaldehyde. This varies between 15 to 30 grms. per 1000 grms. of phenol, depending upon the properties desired in the final product. The third prerequisite is an optimum time period for the chemical reaction.

The proper balance between amount of catalyst and time of reaction will secure a resin which when acidified will not precipitate from its water solution when it is cooled to 10°F.

The fourth feature of the process is the use of lactic acid or phathaolic acid added at the end of the condensation to neutralise the free alkali.

If the four conditions are followed carefully, a light-coloured, wholly water-soluble resin is obtained. These newer water-soluble resins are known as hydrophilic products.

In actual practice it is customary to bring about the initial chemical reaction a' a lower temperature of approximately 7?°F for 2½ to 3 hours. The principal reason for the low-temperature process is better control over the strong exothermic reaction. This heat of reaction for a phenol-formaldehyde ratio of 1 to 2 35 is 158.9 B. t. u. per lb. of reactions. Dissipating the heat through the water-cooled jacket of the reaction vessel makes it comparatively easy to obtain precise temperature control for large kettle batches and also provides a more economical use of kettle space. On high temperature reactions careful supervision is required to prevent super-condensation at 104°F which may seriously affect the hydrophilic character of the resins.

VACUUM DEHYDRATION.

At this stage the resin is chemically a mixture of several phenyl alcohols, as such or in chemical combination with one another as a result of the elimination of a molecule of water. For the average molecular size cannot be large since the initial resinous condensation product contains upward of 40 per cent. of water, which is

removed by heating the resinous mass in a jacketed kettle to a final temperature of of 75° to 85°C. under vacuum at a pressure of 30 to 50 mm. of mercury. For 1600 lbs. batches the time cycle may be from 10 to 15 hours. The rise in viscocity during dehydration under heat is not only attributable to the elimination of the solvent water but is parallel to a marked degree by the increase in molecular dimensions.

The properly dehydrated product is a light coloured or water-clear resin having a moisture content from 5 to 12 per cent. It is fusible and soluble, and has a honey like consistency. In this condition it is poured hot into open lead moulds, split moulds, glass moulds, etc., preparatory to an oven cure at 75° to 80°F. for 3 to 7 days.

Naturally, the rate of heat hardening or polymerisation to produce the final infusible, insoluble resin is primarily determined by formulation and operating procedure.

The curing rate, however, cannot be too fast or the air bubbles that are admixed with the resin at the time of pouring will not have sufficient time to rise before the initial gelatin or heat hardening.

The end point of the polymerisation for oven curing cycle is carefully controled by removing samples periodically from each run and testing for hardness.

COLOURABILITY.

One of the most important phases of operations in the manufacture of cast resins is the wide use of dyestuffs and pigments to obtain phasing colour effects. Of course, the colours must be chosen for their stability to chemical action, heat, and light. Since the colour must be incorporated with the unfinished reactive liquid resin, it must wholly resist the severe action of the phenyl alcohols, free formaldehyde, and lactic acid. For many colouring agents this is rough treatment, not to mention the heat hardening of the plastics at 78° to 80°C for 3 to 7 days.

8. *Moulding Powder Being Poured.*

SOYABEAN-PHENOLIC MOULDING POWDER.

Soyabean protein plastic is made up of about equal parts of phenolic resin, wood flour, and soyabean meal from which the oil has been extracted with solvents. The soyabean meal may be hardened with formaldehydes. This gives a mouldable plastic with a water absorption lower than that of casein but higher than that of straight phenolic material. Then modified soyabean plastics have nearly as great impact strength as the straight phenolic plastics and are more easily dyed light colours.

A typical formula is as follows:—

Formaldehyde	250 lbs.
Ammonia	26.3 „
Phenol	250 „
Alcohol	33 „
Pigments	25 „
Hexamethylenetetramine	26.3 „
Water	12.4 „
Stearic acid	4.1 „
Zinc stearate	4.1 „

The phenolic resin is first prepared by reacting the phenol and formaldehyde in a large stainless steel, steam-jacketed reaction kettle, usually in presence of an

alkaline catalyst (ammonia). The other ingredients are added and the batch is then mixed, first in a steam-jacketed mixing vessel, then in a mixer until thoroughly homogeneous.

After this it is dried and ground in the usual way, and screened. The moulding powder which emerges from the screening operation is finally blended with lubricants such as stearic acid, zinc stearate, or calcium stearate. Hexamethylenetetramine is usually added as an activator for the phenolic material.

Moulding powders of this general type have been produced for phonograph records and bottle caps.

UREA PLASTICS.

Urea plastics is prepared in three stages. First a quantity of neutralised formalin, urea (or thiourea), and a small amount of ammonia are allowed to stand in the the cold for about 2 hours to react, forming a transparent, liquid, A-stage resin which contains about 60 per cent. condensation product. The character of the reaction product depends on whether an acid, a neutral, or an alkaline condensation medium is used. In the presence of ammonia or other alkaline condensing agents, mono and dimethylolurea crystalline compounds are formed. Theoretically, one molecular proportion of urea to two of formaldehyde should be used, but practically the formaldehyde ratio must be reduced to 1.5: 1 to reduce the tendency to form gas bubbles during moulding.

If the reaction is carried out carefully in cold alkaline solution an almost quantitative yield of dimethylolurea is obtained.

The A-stage resin may be used for the impregnation of paper, carboard and fabrics, and may then be hardened by heat. Impregnated sheets may be laminated and hardened under heat and pressure to form decorative, strong, resistant boards and panels. Liquids for impregnating and laminating are frequently modified with other materials such as phthalic -anhydride and glycerol, the latter helping to fix excess formaldehyde.

Fabric may also be impregnated with the A-stage resin and squeezed almost dry before subjected to conditions which convert the resin to the C-stage, to produce modified, crease-resistant materials.

A convenient solution for treating fabrics contains 20 parts of 40 per cent. formaldehyde solution, 10 parts of urea, 5 parts of boric acid, and 60 parts of water by weight. The fabric is immersed at room temperature, removed, squeezed, dried at 130°F and held at room temperature for 3 minutes. Finally the fabrics cured by heat.

If cast resins are to be prepared, the pH of the condensation liquid is adjusted, and various modifiers added. Glycerol is added to facilitate removal of the water, as well as neutral salts to prevent turbidity during the hardening. The partially polymerised liquid is distilled to a thick syrup, dyes being added if desired, and is cast into moulds. A mould of porous metrial impregnated with semipermeable membrane which allows passage of the solvent may be used. Polymerisation with the elimination of water to form C-stage resin effected with heat. Cast blocks may be machined and polished.

If moulding powder is to be produced, the intermediate resin is boiled to increase its viscosity and start the polymerisation. The most stable material is produced by polymerising one molecule of monomethylolurea with one of demethylolurea. Thiourea is sometimes used in moulding powders.

The method of manufacturing urea-formaldehyde moulding powder is as follows:—

Urea and formaldehyde are condensed by heating for 2½ to 3½ hours at pH 7.5-8, and incorporated with paper pulp in the ratio 306 parts of aqueous resin syrup to 174 parts of paper pulp. The mass obtained is dried in a rotary drier to 1-2 per cent. free moisture and ground with 0.2 per cent. zinc stearate, 0.1 per cent. cyclohexanol stearate (lubricants), and 1.0 per cent tri-ethyl phosphate as hardening catalyst. The addition of 1 per cent ammonium carbonate is recommended as stabiliser. It is stated that moulding powders made in this way can be stored for 6 months at 35°C without deterioration. The interesting point about this process is the use of organic phosphates as hardening agents.

Another typical recipe is as follows:—

Urea	42	lbs.
Formaldehyde (37.5 p.c.)	42	,,
Cellulosic filler	40	,,
Curing agent and lubricant and dye	1.8	lb.

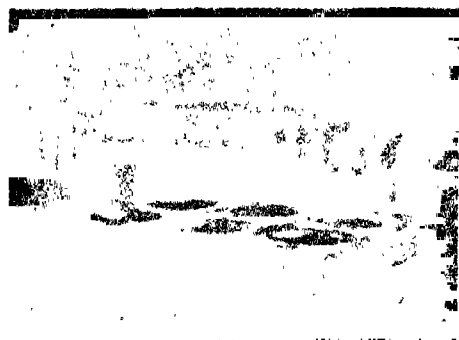
MELAMINE FORMALDEHYDE PLASTICS.

Melamine is the most promising of the engines that can be condensed with formaldehyde to form resinous products. These resins can be used to produce moulding powders and moulded articles and with alkyd resins to produce light-coloured coatings and baking finishes. They are somewhat similar to urea-formaldehyde resins and are thermosetting. So far their chief commercial use has been as a binder, especially in insulating and in abrasive compositions.

Melamine aldehyde resins used in place of ceramic binders in resistors for lightning rods or other electrical uses are prepared as follows:—

A mixture of 12.6 parts of melamine to 162 parts of 37 p. c. aqueous formaldehyde is adjusted to a pH of from 7.2 to 9.0 by the addition of caustic soda. This syrupy mixture is refluxed for 10 minutes and then sprayed at a rate of about 10 lbs. per minute into a hot-air drier, the interior of which is kept under a 2 inch vacuum. The white resin powder that condenses may be discharged continuously from the container.

One part of this resin mixed with 4 parts of silicon carbide and a small percentage of flake graphite makes a suitable moulding composition, the moulded parts being superior to ceramics in that they do not crack when baked and are never weakened and may be strengthened by the high temperatures engendered by heavy electrical loads.

In making melamine resin binder for abrasive wheels, a resin is first prepared from 1 part of melamine to 2 of formaldehyde. It is desirable to wet the grit particles with a partial ester of a polyhydric alcohol before adding the resin. About 1000 parts of aluminium oxide abrasive grit may be wetted with 50 to 250 parts of ethylene glycol monoformate in a mixer and 100 to 150 parts of spray dried melamine formaldehyde resin and 0.5 to 1 part of phosphoric acid slowly mixed in. When an apparently homogeneous, substantially free-flowing dry powder is formed, it may be moulded under pressure and cured in an oven at about 80°C for several hours and finally at 100° to 150°C for a further period.

9. The Mould Closes.

SYNTHETIC RUBBERS.

These are not, strictly speaking, plastics, but they are closely related to them chemically.

The clue to their production was first obtained by the isolation of a liquid called neoprene when rubber was distilled. This liquid can be made synthetically from acetylene, and polymerizes to Buna rubber in the presence of metallic sodium. (Neoprene contains a double bond).

Another type of synthetic "rubber" is "Thiokil." It is unlike rubber chemically, and is made from certain hydrocarbons (from oil) and salts of sulphur.

Much has been heard of Nylon in this country, but little has yet been seen of it except in such forms as tooth brush bristles. Quite apart from its remarkable properties, Nylon is extremely interesting in that it is a synthetic product which has been built on the lines of a natural one —silk.

Silk has long been known to be related to the proteins (the characteristic food-substances in meat), and these are known to be complex substances containing amino-acid. An amino-acid consists of a chain of carbon and hydrogen atoms, with an acid (C-0-0H) group at one end, and an amino or NH_2 group (derived from ammonia) at the other.

Many years ago, the great German chemist, Emil Fischer, succeeded in making amino-acid molecules join together to form large molecules, closely resembling protein molecules, but these substances were not plastics. The chemists of the American firm of E. I. du Pont de Nemours have, however been successful in producing large molecules, called super-polyamides, which in their chemical structure, closely resemble natural silk, and it is this substance which is known as Nylon.

The threads are drawn out from a molten mass, with the result that the long molecules exert attractive forces on each other, which makes the thread very strong —twice as strong as natural silk. Once again, the basic constituents are air, water and coal; and there is no doubt that Nylon has a great future, as it can be used as a plastic as well as an artificial silk.

COLD MOULDED PLASTIC.

Cold moulded bituminous compositions consist of a mixture of various guming, pitchlike, viscous substances having adhesive properties and capable of being altered by heat and pressure to form a cold binder for various fiillers, natably asbestos.

The binder is prepared by mixing various bituminous or asphalts such as gilsonite, steam-reduced or blown petroleum with various oils such as tung oil, castor oil, linseed oil, fiish oil adding a small percentage of stearine pitch, vegetable pitch or other similar material, and also adding some natural and synthetic resins, depending upon the properties desired.

This mixture is cooked in a kettle, then thinned to the desired consistency with a solvent such as petroleum ether, kerosene, gasoline, benzene, naphtha or a mixture of two or more of these or similar solvents. Plasticizers such as butyl or dibutyl stearate, tricresyl phosphate or chlorinated diphenyl may be added to make the mixture more plastic and improve the heat resistance of the final product. The resulting liquid mixture constitutes the binder (15 to 30 per cent of total mix).

The fiiller usually contains a considerable quantity of short asbestos fibres mixed with other mineral fillers such as talc, kaolin, silica, and various oxidising vulcanizing agents such as sulphur,

litharge and selenium. Driers such as naphthenate, rosin or litharge, colouring matter, such as carbon black or red oxide, and modifying agents may be added depending on the characteristics desired.

The dry filler is placed in a steam-jacketed mixing machine and the liquid binder is poured over it. Mixing is continued until the filler is thoroughly coated with binder and the desired granulation is reached. The product may be further milled until a nontacky moulding powder has resulted. This is screened and graded according to particle size, plasticity, bulk factor, etc., and is then stored or aged for a week or more. During this aging period, the powder is spread out and air-dried. Loss of the solvent leaves a non-tacky powder suitable for immediate moulding.

Just before moulding, the powder is usually mixed with a small percentage (0.5 to 1) of a lubricant such as a metallic stearate or neutral soap. The moulded articles produced must then be baked for about 24 hours in an oven in which the temperature is gradually increased (20°F per hour) from 200° to 400°F. Baking causes evaporation of volatile materials, polymerisation of certain of the constituents, and oxidation and hardening of the oils. A hard, stable compound results Air in the ovens must be kept in circulation during baking.

The articles removed from the oven may be subjected to further finishing operations if necessary. Burrs and fins are removed in tumbling barrels when pieces are sufficiently small, and with a disc or belt grinder. A polish may be applied by tumbling pieces in wax-coated sawdust.

A formula for a typical cold-moulding composition is as follows :—

Stearine pitch	.. 40 parts	Bind[illegible]
Asphalt	.. 60 ,,	
Castor oil	.. 10 ,,	
Benzol	25-100 parts	
Asbestos	.. 1100 parts	Filler
Sulphur	.. 66 ,,	
Iron oxide	.. 22 ,,	

This filler to be used with 286 par[illegible] of binder mentioned above.

MOULDING AND FABRICATION.

All the fabricating operations carrie[illegible] out on plastics can be considered [illegible] moulding, but in practice the nomencl[illegible]ture of the processes adopted is [illegible] follows :—

1. Blowing or shaping of thermo[illegible] plastic sheet.

2. Extrusion through nozzles or die[illegible] This process applies to both thermo[illegible] plastic and thermo-setting plastics.

3. Compression moulding. This [illegible] the most general method adopted in fabri[illegible]cating from thermo-setting mouldin[illegible] powders. It is rarely adopted for thermo[illegible] plastic powders.

4. Injection moulding. Almost sole[illegible]ly used for moulding thermoplastics. In[illegible]jection of thermo-setting resins has bee[illegible] examined, but success is, so far, limited.

19. The Finished Mouldings on Ejector-Pins.

BLOWING.

Many hollow fancy goods and toys are produced in celluloid or acetate by this process, in which two metal dies in a press are employed. In principle, two sheets of the plastic are held between steam-heated upper and lower dies and by the injection of air between the sheets are moulded into the dies. The sides of the sheets coalesce under the heat, forming a hollow shape, and the dies are cooled with cold water. On opening the press the moulding is removed.

Equipment used consists of: Split moulds; low pressure presses, air or steam pressure: de-finishing device (tumblers).

Advantages of blow moulding: Hollow shapes; medium priced raw materials.

Disadvantages: Limited raw materials; poor reproducibility of design: single-cavity operation; necessity of cooling mould.

SHAPING OF LARGE PLASTIC SHEET.

While, fundamentally, there is no difference between this process and simple bending of thin small-sized sheets, it is described, because of recent years the application in industry of very large sheets of thickness 1/4 in. and even over has grown very rapidly. Enormous quantities of "organic glass", that is, cellulose acetate, and "acrylic" resin sheets are required for the windows and gun-turrets of aircraft, while the use of opaque acetate sheet is steadily increasing for ventilator ducts, ammunition chutes, etc., in the same industry.

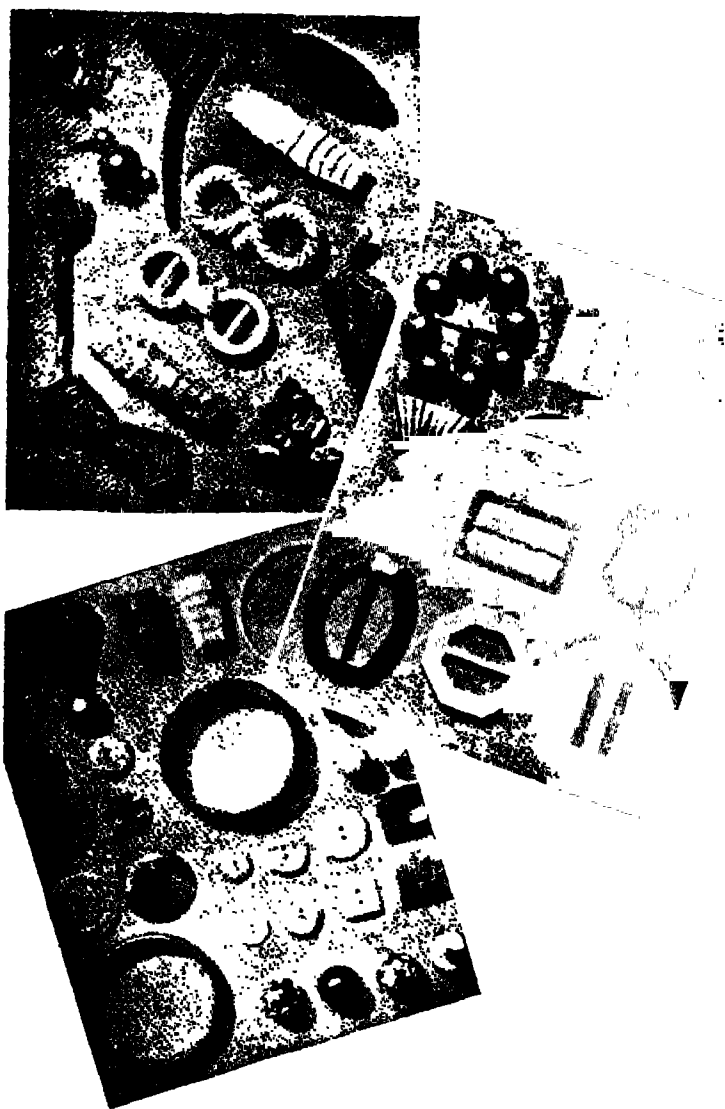
Increase of size and increasing complexity in design has, however, necessitated the introduction of special plant. The heating of sheets of 1 sq. yd. surface obviously calls for large ovens thermostatically controlled, and the shaping of them has brought into use special moulds and jigs to hold the sheet in place while it is being cooled. The production of moulds and jigs, which are usually of hard wood, are often excellent examples of the engineer's skill, especially when it is realised that double curvatures in the plastic are often required, that high dimensional accuracy is necessary and that no uneven strain on the sheet during forming must be executed.

The sheet of plastic is heated in an electric oven maintained at about 120°C. Usually the sheet is hung up by means of clips, one clip being used to hang the sheet on a strong wire: another clip allows for removal of the sheet when it is soft and workable. When this state is reached it is quickly removed from the oven by the operator, who draws it firmly over the mould, using the two clips to secure a grip. The jig is then closed and the plastic sheet kept stretched over the mould until it is cold and rigid.

Trimming to design or removing waste may be carried on while the sheet is soft by means of shears, or, alternatively when cold by sawing. These plastics have no grain: they lend themselves admirably to most types of machining, such as bevelling, turning, etc. Jointing pieces of acetate or "acrylic" resin sheets is readily carried out with satisfaction by the use of simple organic solvents, scarf and strap joints being widely employed. The surfaces may be buffed and highly polished to a glass mirror finish, or, alternatively matt-surfaced by spraying with organic solvent.

EXTRUSION.

The process, which originated with the production of celluloid and casein rods or tubes and also of rubber tubes, has, in recent years, been adopted for many of the new thermoplastics and even for thermo-setting resins.

The method is essentially the forcing of plastic by means of a plunger through

11. Some Examples of Fancy Goods.

a heated nozzle of simle circular or square cross-section if a rod is required. If a tube is to be made then a concentric mandril is introduced, the plastic being extruded in the annular space between the two. This method of producing cellulose acetate tubing, for example, is preferred by many users instead of the older method of shaping an oblong piece of thin sheet and the "welding" by the steam. Much thicker tubes can be produced by extrusion, and the complete absence of a joint is welcomed.

Extrusion is now commonly carried out on the polyvinyl and polythene type of plastics for making electric cable covers and for producing continuous coloured stripes or ribbons for shoe and belt manufacture.

Within the last ten years extrusion of thermo-setting resins of the phenolic and

urea types has been successfully achieved, notably in Germany and Great Britain.

The method adpted, although on broad principle the same as that utilised for the thermo-plastics, differs in the internal mechanism of the extrusion machine in that here the moulding powder must be compressed and heated to flow point in one section, heated until cured in another, and finally cooled.

The machine employed by Gestetner Ltd. is automatic and consists of a feeding chamber, a ram actuated by a hydraulic three-throw pump and an electrically heated die with feeds on to a mandril 4¼ in. diameter. The extruded tube is thus 4 in. width internal diameter and about ¼ in. in wall thickness.

In order that there should be no clogging of the feeding chambers by premature curing, there must be no heating before the resin powder enters the die proper. The ram, therefore, first presses the powder into a chamber which is maintained at a low and constant temperature by cold-water circulation in a surrounding jacket. The resin powder is thus maintained in a compressed from some inches before it enters the die. The die or curing chamber is an annular space some 9 in. long and is progressively heated along its length by three electric elements "stepped up" to obtain successive temperatures of 130°, 160° and 180° As the time of cure in this 9 in. length is about 1½ minutes, the ram works to an output of some 6 in. of tube per minute. The finished tube issues on the mandril and is sawn off in convenient lengths after close optical examination for faults such as scorching.

COMPRESSION MOULDING.

This type of moulding is carried out most commonly on the phenol and urea moulding powders, that is, the thermo-hardening synthetic resin plastic It consists in placing a quantity of th powder or a compressed tablet of th powder in the lower half of a heate mould, held on the platens of a hydrauli or mechanical press. The top or plunge half of the mould is then lowered, slowl compressing the plastic, which, under th hot conditions of the press, flows int every cavity of the space between the to and lower halves.

In practice the quantity of powde required to make the finished moulding carefully weighed with a slight exce and emptied into the lower cavity and th top plunger slowly lowered, using at firs a comparatively low pressure of the orde of 300 lb. per sq. in. for some few seconds During this period the mould is not en tirely closed, but soon the pressure i increased to slightly over 1 ton per sq. in and the mould is finally closed. Th moulds are heated by steam or electricit to a temperature of about 350°F. and th moulding is held therein until final hard ening takes place. This period varie greatly with the thickness of the mould ing, temperature, etc., but is generally o the order of ¼ minute to 1½ minutes fo thin or relatively small objects. Obvious ly, before carrying out continuous pro duction a number of tests are carried ou to ascertain the best temperature anc curing times under which a particular moulding must be produced.

The plunger is raised as soon as the period of "curing" has elapsed and the finished moulding is either removed by hand or ejected with special pins. In most cases the moulding needs no finishing, with the possible exception of the removal of excess powder or "flash" has been squeezed out between the upper and lower halves of the mould and which remains adhered to the moulding.

The moulds are made of special steels and when moulding urea powders must be chromium plated to prevent discoloration. It is interesting to note here that with the increased importance of rapid output the mould is usually machined to take more than one "shot" of powder. For medium-sized moulding it s quite common to produce 4 to 6 in one mould, while in the small sizes, such as black piano keys, 30-impression moulds have been employed.

In the ordinary vertical plunger type of mould undercuts in the moulding are obviously not possible, but when undercuts are essential in the moulding, split moulds, in which the lower part is made in two sections and can be pulled apart sideways, are employed. Alternatively, side ram presses produce the same effect. The sizes and capacities of presses vary greatly, the small type being capable of exerting a total of 50 tons pressure and very large ones 3,000 tons used for making radio cabinets and motorcar facial boards.

An interesting development in compression moulding that has been carried out for many years is the simultaneous incorporation of metal inserts in the moulding. This is of considerable importance in the electrical industry, where, for example, a threaded insert is utilised to receive a screw. Again, for purely decorative purposes, metal filigrees may be placed in the bottom of the die, prior to the addition of the moulding powder, so that the filigree becomes one with the finished moulding.

INJECTION MOULDING.

In broad outline, the process of injection moulding, in which the moulding powders are almost universally the thermo-plastics cellulose acetate and ploystyrene, consists in softening the powder in a heated cylinder and then forcing the plastic by means of a piston into a cold metal mould that is kept closed during the moulding operation. This pressure by the piston is maintained until solidification takes place in the mould. The piston is then withdrawn, the mould is opened and the finished moulding is efflected.

The machine can be vertical or horizontal; some are semi-automatic or totally automatic. The advantage of the horizontal type is the ease of feeding and ease of emptying the moulds. On the other hand, the horizontal press is generally used for the production of smaller moulded objects, while the vertical presses can more readily be worked for mouldings of 4 oz. and over.

In the horizontal type the mould is almost always a multiple mould, that is, from two to, say, ten complete objects are made at every injection. The fluid plastic enters the mould through a narrow "gate" and spreads through channels to the dies. Thus, when the mould is emptied the moulded objects are ejected together because they are connected by a thin strip of plastic. This connecting strip is easily removed and the mouldings need little or no finishing operations.

The ease of operation of these machines and the rapidity of production by them has greatly increased their popularity in the last three years. Assuming an 8-impression mould and a 20-second moulding cycle about 1,400 small mouldings can be produced every hour. To-day, combs, radio-knobs, bottle-closures, coat hangers, watch-cases, fountainpens, and a host of other objects are thus being made.

CAST PHENOLIC RESINS.

In addition to the foregoing methods of transforming the halfstage liquid resin into moulding powders, etc., one of the

most interesting is the production of transparent solid forms by the very simple process of casting it without fillers.

The hot half-stage resin in syrupy form is poured into lead, glass, or rubber moulds, which are placed in heated ovens maintained at 75°-80°C. for considerable periods. Forty-eight hours or more are generally required to transform the half -stage soluble resin to its final infusible, insoluble form.

The chief advantage in casting resins is the fact that lead, glass, or rubber moulds are simply and cheaply constructed, and where lead moulds are employed they can be re-melted and the lead re-used. In the moulding of resin powders, extremely accurately machined and costly moulds of special steels are necessary. Thus, for the production of a cast resin rod a simple lead tube closed at one end is made. This rod, when finally hardened, is removed from the mould and on slicing, drilling, otherwise machined, and finally polished, can be made into buttons, etc.

RESIN IMPREGNATED AND LAMINATED PAPER.

The impregnation of relatively large sheets of paper and other absorbent materials with resin, by using alcoholic solutions of resins in the first stage, has introduced a new raw material for a type of fabrication which is not possible by the moulding of powders. Since paper coating has long been known, continuous rolls of paper, say 6 ft. wide, can readily be impregnated with resin. It can therefore be readily realised that by consolidating under heat and pressure, a large number of these single sheets, a thick and large sheet or block of solid construction is formed.

The impregnating or dipping plant consists of huge machines which are, in effect, conveyor rollers. At one end a large roll of paper, some 6 ft. wid rotates, carrying the paper sheet forwa and down into a shallow tank running th width of the paper and containing solution of the synthetic resin in alcoh From this tank the paper, now wet an saturated with the solution, enters a lon enclosed chamber, often 100 ft. or long, through which hot and conditione air is passed to remove the solvent, leav ing the pure resin impregnated in th poper. By the time the paper leaves th heated chamber it is perfectly dry and rolled on rollers at the other end of th plant. The paper now has the appear ance of a translucent shiny sheet with hard surface.

The impregnated sheets are then cu into sizes suitable to the presses availabl

A number of such sheets ther according to the thickness of the com pressed "board" required, are placed on on top of another, placed between tw highly polished metal sheets and compres sed between the heated flat platens of hydraulic press. The press may contai as many as a dozen platens, so that large number of laminated boards can b produced at the same time. The platen are heated by steam, giving a temperatur of about 170°C. and a pressure of ½ ton to 1 ton per sq. in. is exerted on the sheet The resin is thus heat-hardened to it final infusible condition. Sheets 1 in thicl and over can be made. Insulators o many types can be produced by sawing drilling or otherwise machining thin or thick sheet. For the production of insulator tubing the impregnated sheet as produced on the dipping and drying machines is wound on to rollers and then cured on heated mandrils.

TRANSFER MOULDING.

Transfer moulding is a technique developed for thermosetting compounds

hereby use is made of preheating cham-r from which the moulding compound ejected into the mould proper when rrect plasticity is reached. Transfer ulding is limited to the phenolic mate-ls at the present time. By proper ting and with adequate pressure even fabric filled phenolics can be transfer ulded.

Due to the fact that the moulding terial is rapidly heated in thin sections fore entering the mould cavity, the ulding cycle is substantially shortened.

Regardless of the number of mould ities, only one charge of material is uired, thus the time otherwise used in ng each individual cavity is saved. e to the fact that the preheated material vs into the mould in soft condition and very low pressure, there are no ges, caused by high pressures, displace or distort fragile cores or in-s. Many products with delicate glass rts have been successfully moulded in e volume.

As the mould cavity is closed at the the preplasticized material enters, it bvious that the finished product will be absolute dimensional accuracy and e uniform strength and quality through entire structure; also, that flash or fins entirely eliminated, this resulting in er finishing costs. Because moulding erial is preheated and softened before ring the mould cavity, abrasion of the shed surface of the mould, caused by orms or hard compound, is reduced minimum. This does away with the ssity for buffing, with the attending ger or exposing the filler underneath pure resin skin of the moulded article.

Gases or occluded air within the lding compound are dispelled in the eating chamber, the result being com-elimination of losses due to blisters or flow marks. The primary advantages of transfer moulding may be summed up as follows: Improved quality—ability to mould intricate shapes that cannot be produced by any other known method—extreme accuracy in location of inserts—reduction of moulding cycle—substantially lower finishing costs—elimination or substantial reduction of rejects.

The equipment required for transfer moulding is similar to that used in compression moulding procedure; however, in addition to heated steel platens on the presses, the work table must also have heated steel areas. Each mould or set of moulds must have available pots of appropriate size. The moulds themselves do not have to be so elaborate as the usual compression moulds.

COLD MOULDING.

Cold moulding is one of the other fabricating methods and is limited to special cold moulding compounds. These consist of a binder of mixtures of synthetic and natural gums and pitches with fillers, for the most part mineral, such as asbestos. One part of binder to three of filler is commonly employed. Small additions of lubricants, plasticizers, and solvents are knealed into the cold moulding mass to obtain proper consistency.

This raw material is compressed under high pressure (10000 lbs. per sq. in.) in cold steel moulds utilising fast-operating presses. The member of cycles approaches punch-press operating (300 to 400 per hour). The piece thus moulded is far from being finished. It must be cured by a baking treatment under carefully controlled conditions, starting out with a low temperature and gradually rising it to 400° to 500°F. In some instances the piece is coated with an alkyd resin finish prior to baking.

There are two general classes of cold moulded compound Non-refractory; Bitu-

minous base; phenolic resin base refractory type.

Binders commonly used are: Bitumen; gilsonite: pitch; asphalt; copal; shellac; bentonite; portland cement; sodium silicate. Fillers generally employed; Asbestos; iron oxides; slates; clays. Solvents: Naphtha; alcohol. Drying oils; Linseed.

Equipment used in mixing: Mixing kettles; mechanized agitators; screens; air-tight containers.

Moulding procedure: Charges are added to cavities on a volumetric basis using loading boards or pills. Presses are closed slowly at first, followed by abrupt bumping. Pieces are ejected by knockout pins of large area.

Processing: The pressed pieces are air dried, then baked from 24 hours to several days.

Advantages of cold moulding process, Cheap raw materials; excellent heat resistance; rapid moulding cycle; inexpensive moulds; no need of heating moulds; good electrical properties.

Disadvantages: Restricted colour possibilities; long after-treatment; variable shrinkage; poor appearance; poor mechanical properties; high pressing pressure; limitation of designs; high mould wear low surface hardness.

LAMINATING.

Laminated plastics are reinforced with a strong web of paper or cloth. This combination of resin and finished cloth or paper produces a complementary effect whereby the weakness of one are vastly strengthened by the other, and the result is a well-balanced reinforced plastic suited to an almos infinite number of uses.

In the manufacture of laminated plastics the success or failure of the finished product depends upon the exact control of small details all through the process. The following is a representative of the methods used in the industry; Cloth or paper is dipped into a pan containing resin dissolved in a solvent, run through squeeze rolls and led into a dryer, either vertical or horizontal where the solvent is removed and the resin is converted from the A or soluble and fusible stage to the B or insoluble and partially fusible stage. It is then wound up and either used from the roll to make tubes and rods, or cut into lengths for pressing into sheets at about 300°F and 1500 lbs per sq. in. pressure. Polished plates are used against these sheets if a shiny surface is desired, or grained, brushed or sandblasted plates may be used if this finish is called for. The final application of heat and pressure consolidates the structure and converts the resin to the C or insoluble and infusible stage.

Two types of tubes are made, moulded and rolled. In both cases the cloth or paper is rolled on a mandrel having the correct inside diameter but the moulded tube is placed in an oven and baked for several hours. Each of these tube has certain advantages for different applications. The manufacture of rods is the same as the procedure for making tubes except that a small mandrel is used which is withdrawn before moulding.

Another type of laminated plastic is "macerated moulded". Cloth or paper impregnated with resin is cut into small pieces and moulded to various simple shapes in much the same way that moulding power is handled, but finished pieces are produced which have much higher mechanical strength.

CALENDERING.

The methods of calendering involve brushing, spreading with a doctor knife, rolling on a hot melt; and dipping through tanks.

In one type of fabric coating the machinery for application is a calender consisting essentially of three hollow

rollers held at the desired temperature The plastic mass, heated or masticated to the proper condition on a two-roll mill, is placed in the nip between the upper and middle rolls where it forms a bank. These two rolls have a speed differential which applies a smearing action and a film is formed which is carried around the middle roll to the point at which it meets the lower roll.

From this point one may choose three different operations. The simplest remotes the film by rolling it up, with or without a liner to prevent adhesion. This is known as calendering or filming. If a sheet of fabric is introduced between the middle roll holding the film and the bare lower roll, one obtains either of two effects. When the bottom roll runs slower than the middle roll, the film is mashed or frictioned into the interestices of the cloth and we obtain something approaching impregnation without solvent. If the speeds of the middle and lower rolls are equal, the pressure may be adjusted so that the film adheres to the cloth and releases from the middle roll. This is called skin coating and the film lies essentially on the surface of the cloth although enough studding in is obtained for proper adhesion. With this latter adjustment, one may coat paper as well as fabric.

The basic reasons for employing the skin coating technique are to avoid the expense and hazard of solvents, to prevent excessive penetration, and to obtain a smooth surface which would otherwise be impossible unless the fabric were first carefully dried. Both thermosetting synthetics have been applied by means of the calender. The method is extensively used in coating paper with vinyl chloride—vinyl acetate co-polymer. Plasticized polyvinyl chloride and vinyl co-polymers are very successfully used in cloth coatings and in some cases it is being applied as a surface coat by the skin coating technique. The thermo-plastic coatings are merely cooled after having the calender and the product is complete except the embossing which is a typical plastic phenomenon. When thermo-setting resins are used, the coated cloth must be submitted to a baking operation which is comparable to the vulcanisation of rubber although the baking cycle may be shorter.

FINISHING OF PLASTICS.

In the plastics industry the term finishing is broadly used to cover those operations subsequent to or supplementing the actual moulding or fabricating processes. The process of finishing in this case will be limited to removal of gates, sprues and runners, flash or fins, hand filing, barrel tumbling finishing, wheel polishing and buffing.

Plastic as taken from the mould cavity are first subjected to what is known as rough finishing; that is, the removal of the flash from the parting line and the openings in the moulded pieces. Then follow drilling and tapping operations, together with any other machining which may be necessary, after which a final buffing or polishing is added to produce the desired quality and lustre of finish.

Although the finishing process begins when the piece leaves the mould, nevertheless the mould itself plays an important part in the finish imparted to the piece. Periodic inspection of mould surfaces is desirable.

HARD FILING.

Hard filing is probably one of the costliest methods found currently employed on odd-shaped parts and irregularly formed pieces. Among the numerous pieces often requiring hard-file finishing are the sprue marks appearing on injection moulded items. These require careful hard-filing in order not to mar the finish on the moulded article.

SANDING.

In the finishing of many plastic moulded parts, the use of flexible abrasive belts is particularly adaptable. These abrasive belts with grits of No. 220 to 320-mesh have been founded most useful for rough finishing plastics and for the removal of sprue projections and heavy flash lines on both thermoplastics and thermosetting pieces.

CEMENTING.

It is often desirable to cement two plastic parts together instead of joining them by some mechanical means. With cold-set plastics, a properly cemented joint will have 60 per cent. of the strength of the plastic.

For a properly cemented joint, it is necessary that exactly the right amount of cement be applied to the parts to be joined. After this the two-parts should be held together under slight pressure until they are fairly dry.

The cementing of plastic parts must be confined to parts moulded of the same type of material, as dissimilar plastics do not bond together.

For the strongest bond, special phenolic amounts are recommended depending on the type of plastic. With the thermoplastics solvents may be used for cementing. Acetone with or without dissolved cellulose acetate has been used with success for the cementing of cellulose acetate parts. Ethyl acetate may be used with equal success on polystyrene parts. Acryloid B-72 cement has been used satisfactorily on parts moulded from vinyl plastics moulding materials.

CARVING.

For the removal of flash, sprues, and runners from thermoplastics mouldings, the use of a carving spindle will be found to be economical. These spindles operating at high speeds, can be equipped with number of rotary cutters and tools which permit quick removal of sprues and gates, giving a fine clean surface requiring little or no polishing.

PUNCH PRESS WORK.

Pieces moulded of thermosetting plastics frequently have lateral type fins which are difficult to remove other than by the use of hand files for the rough edges. When properly handled, punching, blanking, shearing, trimming and shaving can be done on moulded pieces, and the cost of the tools employed will be more than offset by the speed and economy in producing the finished part.

TRIMMING.

In some cases of thermoplastic moulded parts, runners, sprues, and gates can be removed on punch presses. Making use of the fact that a punch press employs a shearing or shaving operation, a complete short of injection-moulded parts can be placed in a trimming die and the gate and sprues removed with a single stroke. Raised gates are removed by a shearing cut on the die. Pieces of an irregular shape which must be finished carefully usually have gates removed on a single-blade punch press.

It is desirable that all thermoplastic parts be at room temperature of 70°F or higher before punching. Cold pieces tend to fracture back into the part on punching thereby having a rough broken surface. Many moulders remove the gates immediately after moulding when the inner cover of the part is still quite warm. This latter method can be used with success on polysterene or vinyl moulded parts when removal of the gates on the punch press, at room temperature, would cause fracture of the pieces.

DE-FINNING BY TUMBLING.

For the polishing of thermosetting i.e phenolic or urea moulded pieces only one operation is necessary, namely the lustre

finishing operation. However, for these moulded parts a de-finning barrel is used to remove the rough die flash. This operation is preliminary to the polishing operation, and the dust acquired by the mouldings in this operation must be removed by an air blast before starting the second operation.

On articles moulded from urea or phenolic moulding materials there are certain type of pieces where due to the design, very sharp edges, or other reasons, the de-finning operation cannot be used and they must be filed or sanded. For this type of part the lustre finishing operation is used. Furthermore, the de-finning operation is limited to articles such as buttons, slides, bottle and jaw caps. Knobs used for furniture, automobile and hardware trimmings, mouldings for the electrical trade, and all other mouldings alike in design and size. It is estimated that 75 per cent. of these moulded parts can be definned in a barrel. The de-finning operations requires from 3 to 15 minutes depending on thickness of flash. Barrel speeds from 20 to 40 revolution per minute are required.

POLISHING BY TUMBLING.

For the polishing operation a solid, octagon-type, hard maple barrel is used usually with two pockets. The two-pocket barrel is the more practical, as different colours or different sizes and types of moulded parts can be finished at the same time without mixing. The polishing operation is simple. A special lustre wax is used with shoe pegs of various sizes as are carrier and burnish-medium. The time required is from ½ to 5 hours depending on the quality of finish desired.

The barrel is employed into a dumping box placed underneath the barrel, and the shoe pegs are separated over a screen of the correct mesh which holds up the parts and permits shoe pegs to drop through.

POLISHING WAX.

A typical formula of polishing wax is as follows:—

Stearic acid	4 oz.
Spermaceit	4 „
Hard paraffin	4 „
Carnauba wax	4 „
Beeswax	2 „
Turpentine oil	4 „

The ingredients are melted and then mixed in a 1-gallon can, and diluted with enough turpentine oil to fill the can. On cooling it is set into a hard mass and should therefore be used after warming.

POLISHING BY BUFFING WHEEL.

For larger pieces hand polishing or wheel buffing is necessary. The first important factor in hand polishing is, of course, the correct equipment. The correct speed of lathes for thermosetting plastics using a 10 to 12-in. diameter wheel 4 to 5 in. wide is approximately 2500 r.p.m. A speed of approximately 1500 r.p.m. is used for thermoplastic materials.

Articles moulded from plastics can be buffed and polished with fabric wheels of the standard types with some precaution. If the pressure is too great, sufficient heat may be generated to soften the stock and to cause sticking to the fabric wheel. The fabric of the wheel is impregnated with a mixture of 3 oz. or rosin dissolved in 1-gallon turpentine. Immediately after impregnation, press out the excess solution and place the wheel in an oven at 225°F. until the turpentine is driven off. Add directly to the revolving wheel a block made of 100 parts of triethanolamine, 202 of stearic acid and 124 of snow floss. After this add directly to the revolving wheel a block made of 100

(Continued on page 385).

Pharmaceutical Recipes

LIME JUICE CORDIAL.

Glucose syrup	8	gals.
Cane sugar	108	lbs.
Water	20	gals.
Lime juice	18	"
Oil of orange	4	dr.
Oil of nutmeg	4	"
Salicylic acid	2	oz.
Rectified spirit	10	"

Dissolve the sugar in the water by heat, add the lime juice and glucose syrup. Dissolve the oils and the acid in rectified spirit, mix with the cordial and finally filter through a felt bag.

SYRUP OF VASAK.

Liquid extract of Vasak	500	millilitres.
Glycerin	100	"
Syrup, sufficient to produce	1000	"

Mix the liquid extract of Vasak with the glycerin and add enough syrup to make the product measuure 1000 millilitres. Mix thoroughly.

To prepare liquid extract of Vasak proceed as follows:—

Vasak, in No. 40 powder	2000 grams.
Alcohol (60 per cent)	a sufficient quantity.

Exhaust the drug by the percolation process reserving the first 800 millilitres of the percolate. Recover the alcohol from the remainder of the percolate by distillation, and evaporate the residue to the consistence of a soft extract. Dissolve this in the reserved portion, and add enough alcohol (60 per cent) to produue 1000 millilitres.

AGNIMUKHA CHURNA.

Asafoetida	1	part.
Acorus calamus	2	parts.
Long-pepper	3	"
Ginger	4	"
Ajowan	5	"
Chebulic myrobalan	6	"
Plumbago root (chitramula)	7	"

Reduce the ingredients into powder form and pass through a cloth.

Dose : 20 to 40 grains with whey.

RINGWORM OINTMENT.

Salicylic acid	2	dr.
Creosote	1	fl.dr.
Resorcin	1	dr.
Brandy	10	"

Triturate the ingredients in a mortar with the lard and then pack in pots.

PIMPLE LOTION

Crystallised alum	1	oz.
Sodium chloride	1	"
Sublimed sulphur	1	"
Sugar candy	2	"
Spermaceti	2	"
Elder-flower water	3	"
Benzoated lard	4	"
Distilled water	3	"

Reduce all the solids into fine powder and rub up with the mixed liquids. This lotion is to be applied at intervals during the day upon linen rags, which should frequently be changed. It is an effectual and quick remedy for eruptions on the face.

GRIPE WATER.

Aqua menth-pip. conc.	15	mins.
Aqua anethi conc.	½	fr.
Aqua anisi conc.	45	mins.
Tr. cardamom Co.	2	dr.
Rect. Spirit	1	dr.
Simple syrup	4	dr.
Distilled water	3	oz.

Mix.

FLUID EXTRACT OF PUDINA.

Pudina, in coarse powder	100	grms.
Alcohol	600	c.c.
Distilled water	300	c.c.

Mix 600 c.c. of alcohol with 300 c.c of distilled water, and having moistened the powder with 350 c.c. of the mixxture, pack it firmly in a cylindrical percolator then add enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 48 hours. Then allow the percolation to proceed, gradually adding menstruum, using the same proportions of alcohol and water as before, until the pudina is exhausted. Reserve the first 850 c.c. of the percolate.

Distil off the alcohol from the remainder by means of a water-bath, and evaporate the residue to a soft extract, dissolve this in the reserve portion, and add enough menstruum to make the flued extract measure 1000 c.c.

Recipes for Small Manufacturers

CANVAS SHOE DRESSING.

China clay	16	oz.
Whiting	8	„
Bentonide	6	„
Precipitated chalk	4	„
Powdered gum tragacanth	2	„
Carbolic acid	2	dr.
Ultramarine blue	1	„

Mix the powders and knead with water. Divide the paste into small pellets and cast each into suitable moulds.

BINDI PASTE.

Carmine	15	parts.
Gum arabic powder	5	„
Rose water	Sufficient quantity.	

Macerate the first two ingredients with rose water in a stone or porcelain mortar. Add a little boric acid and put in phials.

PEPPERMINT TABLETS.

White stearine	10	parts.
Alcohol	45	„

Mix thoroughly and dissolve.

Gelatine	3	„
Hot water	50	„

Dissolve these, and add with the alcohol stearine solution.

Icing sugar	1000	parts.

Rub the paste through a fine sieve, and dry by exposing to warm air. Sift again and add:—

Peppermint	3	parts.

Keep the mass in well-fitting tins preferably for 24 hours to enable the peppermint to permeate thoroughly.

MOTOR CAR POLISH.

Yellow wax	20	parts.
Finely powdered silica	40	„
Turpentine	40	„
Soft soap	1	part.

Melt the wax and incorporate the powder, slowly adding the turpentine oil, finally stir in the soap, previously dissolved in the water. Some may prefer it to be without the soap, but experience shows it to be worth its slight softening effect in yielding a higher and better polish.

WATCH OIL.

Black oxide of antimony	1	part.
Small lead shots	4	parts.
Almond oil	20	„

Put the antimony compound and lead shots in the oil contained in a white glass bottle. Then expose to sun-light for a month, shaking occasionally and decant the clear oil.

ORNAMENTING EGGSHELL.

Make a small hole at each end of an egg and blow out the contents: then cover the openings with sealing wax and fasten on two matches as spindles. Make a support having a bottom piece 7 in. by 2 in. by ¾ in. and two uprights with notched tops, each 4½ in. by 1 in. by ¾ in., placed 5 in. apart. Melt white wax in a convenient jar, which must be placed on the stand between the uprights and under the egg, resting by the spindles in the notched pillars. Brush wax evenly over the egg, turning it round without fingering the shell. When dry, pencil, penetrating through the wax in order to expose the shell where lines are drawn. Next soak it in strong vinegar for twelve hours, putting something weighty over the jar to keep the egg under the liquid; the vessel should be narrow to prevent the egg floating horizontally. Go over the design with a needle, scratching away the corroded portions: then brush black writing ink plentifully over the egg, let it dry, and remove the wax with hot water very carefully, for the shell is liable to burst during this performance. The ink has soaked into the etched lines, and the picture shows up well on the uncoloured shell. A thin coating of mastic varnish improved the appearance.

MUKHBILAS.

Coriander seed	1	tola.
Aniseed	1	„
Parsley	1	„
Nutmeg	1	„
Ajowan	1	„
Saffron	1	„
Seeds of cardamom major	1	„
Seeds of cardamom minor	1	„
Cloves	1	„
Dry rose petals	1	„
Chua	1	„
Camphor	1	„

Take one tola each of the ingredients excepting the last two and soak them in good rose water for 12 hours. Then bray them together to a paste form and incorporate chua and camphor.

In the Field of Invention

A NEW METHOD PRODUCTION OF RED PHOSPHOROUS.

A new continuous process for the production of red phosphorus developed in the laboratories of the Tennessee Valley Authority, shortens, the time required for processing white phosphorus to red phosphorous from days to hours. (Ind. Eng. Chem., 1948, 40,357). A pilot plant embodying the continuous processs was built and operated during the war to produce red phosphorus of high purity.

The process consists' in heating white phosphorus at its boiling point (280°C. for 5-6 hr.) to convert it to a fluid mixture containing 30 to 50 per cent. red phosphorus, removing the unconverted white phosphorus from the mixture by vaporization, and condensing and recycling the vaporised phosphorus.

The pilot plant consists of a reactor, a vaporizer, and a red phosphorus collecting system. Other components include a white phosphorus feed system, an inert gas heater, and a phosphorus condenser. Liquid white phosphorus is fed continuously to the reactor; a uniform slurry of liquid white phosphorus and solid red phosphorus particles overflows continuously from the reaction into the lower end of the inclined screw conveyor-vaporizer. Hot carbon monoxide gas containing phosphorus vapour is discharged from this end of the vaporizer and passed to a waterspray condenser, in which liquid white phosphorus was collected for recyling to the feed tanks. Finely divided red phosphorus (99 per cent. purity) is discharged at the upper end of the vaporizer into a collecting system.

NEW SWATCH DRYER.

It is understood that the National Drying Machinery Co. of Philadelphia, U.S.A. have invented a novel swatch dryer. This new piece of equipment provides temperatures upto 330°F using steam pressure at 125 pounds and will dry swatches in one minute. Temperatures can be controlled to within plus or minus 2°. air velocity is 1200 ft. per minute. This compact dryer, accomodating upto twelve 8 in × 8 in. swatches in removable frames, offers a practical and economical method of determining the ultimate effect of drying and curing on the colour, by duplicating actual conditions in full size dryer.

—Silk Journal & Rayon World.

A NEW TYPE OF LOOM.

A new type of loom has developed in France. It is the Fayolle-Ancent circular weaving loom, produced by Fayolle et Cie.

The makers claim that the new loom has a productive capacity at least three times that of the ordinary looms. In addition the loom's eight weft carriers, working simultaneously make possible a great variety of patterns without any reduction of speed. The loom can be adapted for all types of fabric, including cotton, silk, rayon and nylon yarns. Simplicity of operation is claimed, whilst the large weft packages used enable the loom to run continuously for long periods with a minimum of stoppages Based upon the quantity of fabric that the loom can produce the machine can operate at a considerably lower cost than ordinary looms.

—Silk Journal & Rayon World

PAPER LABELLING.

To eliminate the use of a paper label, Industry, Inc. of Cleveland, Ohio, has brought out a machine for the direct application of labels to cans, bottles, or other containers. "Koloprint", as the device is called, prints automatically from one to four colours directly on the container. No litho stones, set type, zinc plates, offset blankets, or silk screens are employed. Two special synthetic gum plates for each colour desired are used and the printing is of the direct plate to container type Special cold colour inks of anti-acid, non corrosive, and anti-alkali type have been developed for use in this machine. It is possible to superimpose one colour upon another because the inks harden quickly. Two types of labelling are possible with this machine. One is the permanent labelling and the other is labelling with washable ink. Washable labels fade away in the bottle washer and it is not necessary to sort out the various brands, as would be the case if permanent labels were used. This machine is said to have a capacity of 50 to 100 containers a minute, depending on the nature of the operation. This rate can be doubled where a two track machine is used The machine comes with an electric eye to prevent printing on the seam of the can and is said to weigh about 2,000 lbs. It can take care of any size container from 2 to 14 inches in length, and from 2 to 5 inches in diameter.

Formulas, Processes & Answers

WOOD PRESERVATIVES.

402 S.C.P., Nagercoil—Wishes to have recipes of wood preservatives.

I.

Sodium dichromate	20.6 parts.
Arsenic acid	55.9 "
Zinc oxide	12.8 "
Zinc chloride	10.7 "

This is dissolved in water before use and the wood is impregnated with it.

II.

Potassium dichromate	34 parts.
Copper sulphate	30 "
Chromium acetate	6 "
Boric acid	30 "

Mix. Use as above.

TUNGSTEN ROD AND WIRE.

413 M.M.V., Amritsar—Desires to learn the methods of manufacturing tungsten rod and wire.

The method of producing tungsten wire is carried out as follows: Pure tungsten is produced by reduction of the oxide (wolfram) with hydrogen. The tungsten so obtained is then shaped into rods after mixing with some tungstic oxide and a little glucose. These rods, which may be 12 inches long and 31.16 inch in diameter, are transferred to a porcelain tube furnace, being first dried and afterwards heated in a vacuum to about 1000°C, this heat treatment not only reduces the carbon in the material, but also makes the rod sufficiently strong to be handled. Further heating for several hours in a vacuum chamber by means of an electric current, at a temperature near the melting point of the metal, is suited for the rolling and drawing operations.

Another method:—

Starting with chemically pure tungstic oxide, a quantity is packed into a fused quartz tube having an internal diameter of 7½ inches and about 5 feet long. Pure dry hydrogen gas is passed through the tube for about 10 hours or more, during which time the tube is heated to a temperature of 1100—1300°C. When tungstic oxide is treated with hydrogen the formation of water vapour results, and when a large body of oxide is treated the water vapour it is more or less diffused through the mass, with the result that the oxide is not directly reduced to the metal but progressively to lower and lower oxides. Changing from the blue, brown, and black oxides, to the pure metal. The result of such a reduction is to produce an especially well-reduced body of tungsten in powdered form.

The pure tungsten powder is now pressed up in a strongly reinforced steel mould by a hydraulic press or other suitable means into sticks ½ inch square and 6 inches long. These sticks are subjected to a preliminary firing in hydrogen at about 1200°C. which enables them to be easily handled without fear of breakage.

Next the sticks are mounted in a treating-vessel containing hydrogen or some inert gas and submitted to the passage of an electric current to a very intense white heat. During this treatment any slight impurities present are liberated from the metal. In order to ensure the reducing action of the hydrogen penetrating through the entire mass of the rod, and also to guard against melting out the inside of the rod, the temperature should be gradually and not sending raised to a maximum. The current must also be reduced at a slow rate, to avoid a sudden change of pressure in the reducing chamber or bottles which may result in air being drawn and possibly causing an explosion.

The sintered sticks are removed from the treating bottle are of fine grained crystalline structure. These rods are ready to be worked down to smaller sizes and ultimately reduced, by wire-drawing processes; into fine wire suitable for lamp filaments.

Rods are worked at high temperatures, and by successive passes in the working operations the rods are reduced in diameter by gradual steps to sizes approximately 0.030 inch in diameter. It is found that continued hot working of the tungsten rod changes its structure from what was originally in the sintered rod, distinctly crystalline into a fibrous structure, so that it may be drawn through diamond dies down to sizes as small as 0.0015 inch. At the drawing operation it is usual to keep the wire well lubricated with graphite, which is caused to adhere to the wire prior to the passage of the wire through the die.

GASKET COMPOUND.

423 S.V.P., Karur—Wants a formula of gasket compound.

Asbestine powder	56 parts.
Copal varnish	44 "

Grind in a ball mill for 3 hours.

SOLID STENCIL INK.

435 G.V., Quilon—Wishes to have a process of making solid stencil ink.

A black, soluble stencil ink for marking chests and bales is made by allowing 80 parts of good glue to swell up in water for 12 to 24 hours, and then dissolving it by applying heat

on a waterbath, in 450 parts of fresh water along with 16 parts of yellow dextrin, 6 of sugar, 22 of glycerin, and 26 of water-soluble nigrosine. The solution is next incorporated, by stirring, with 400 parts of lamp black to form a paste, which is then thickened by further heating on the water-bath, until a small sample is found to set hard on cooling. All the superfluous water being thus evaporated, the mass is pressed in greased moulds. The addition of a little or gall will help the ink to run freely when used on greasy material.

CARBON DUPLICATING PAPER.

464 N.K.C., Jullundur—Wants to know formulas and processes of making carbon paper, etc.

Lard	12	lbs.
Japan wax	2½	„
Ivory black	2	„
Prussian blue	2	„

Melt the lard and wax and grind in the black and blue pigments. While still hot, coat paper with the mixture by means of a sash-tool. After standing wipe off the superfluous colour.

FACE POWDER.

Talc	21	lbs.
Magnesium carbonate	2½	„
Boric acid	2	„
Otto of rose	2	oz.
Triple extract of rose	½	„
Syn. neroli oil	1	dr.
Vanillin	½	dr.
Alcohol	3	oz.

Mix the scents in the alcohol to make 3 oz. Then mix with the already mixed powders, sifting again after drying off.

SOLUBLE STARCH.

479 B.V.D.J., Indore City—Wishes to have the process of preparing soluble starch.

To prepare soluble starch, treat ordinary starch with 10 per cent. alkali hypochlorite solution at 130° to 160°F. Lastly add a little formaldehyde as a preservative.

Another method of preparing soluble starch is as follows:—

Take 100 grms. of starch and mix with it 100 c.c. of water acidified with 5 grms. of sulphuric acid. Boil the mixture for 2½ hours. After this remove the excess of acid by adding a little barium carbonate so long as bubbles of gas are evolved. After filtration evaporate the filtrate and precipitate the soluble starch by the addition of alcohol. Collect the precipitate and dried in air.

TRIPOLI BUFFING STICK.

486 K.A., Delhi—Desires to know good recipes of tripoli buffing sticks, etc.

Stearic acid, double pressed	30	oz
Tallow	25	oz.
Hard paraffin	25	oz.
Tripoli powder	20	oz.

Melt the first three ingredients over slow fire. Mix the tripoli powder and remove from the source of heat. Stir until begins to thicken. Then pour in moulds.

FABRIC MARKING INK.

Copper sulphate	20	parts.
Dextrin	10	„
Aniline chloride	30	„
Glycerine	6	„
Distilled water	100	„

Mix in the order given.

LITMUS TEST PAPERS.

These papers are indispensable in all analytical laboratories. These may be prepared thus:—

BLUE LITMUS PAPER.

One part of litmus is digested for a day with 5—6 parts of distilled water and filtered. The solution is divided into two portions, one of which is treated with phosphoric acid, added drop, until the liquid turns red. The next step is to add some of the second portion until the whole is again blue, this finished solution being then used to impregnate fine white, slightly sized paper that is afterwards dried in the shade.

RED LITMUS PAPER.

Blue litmus paper is immersed in diluted phosphoric acid (1 part to 20 of water) and dried.

WAX PAPER.

Wax paper is largely used for wrapping products that contain a certain amount of moisture, which it is desirable to retain: such as tobacco and snuff; also as a covering for gum pots, to exclude injurious atmospheric influences, etc.

A number of sheets of unsized or slightly sized paper of firm texture are placed in a pile on a large table, and a little scraped wax is laid on the top most sheet. On applying a hot flat iron, the wax will melt and penetrate the paper the surplus making its way down into the second and third sheets. As soon as the iron gets cool it must be replaced by a fresh one.

For larger quantities it is preferable to work with a roll of paper mounted on a roller. From this roller the paper is led through an enamelled iron through, containing wax that is

kept in a molten condition by a suitable heating device. The trough also contains a glass rod mounted in such a manner that it can be taken out when required; and on the one edge of the trough is mounted a steel scraper set at such an angle that the band of wax impregnated paper can slide over it without being cut. Just above the scraper are two porcelain rollers set close together so as to remove all surplus wax. The impregnated paper can be allowed to fold loosely on itself at a short distance away, and at the end of several hours will be ready for cutting up into sheets.

BANANA ESSENCE.

10 lbs. of fresh but not overripe bananas are peeled, and only the pulp is used.

Macerate with 20 lbs. proofspirit, and after standing 3 days express off about 10 lbs. extract.

To the residue add

Water	2 gals.
Solution of chamomile oil (1:10)	2¼ dr.
Amyl butyrate	6 dr.
Oil of coriander	12 dr.

Distils off 5 lbs. and mix with extract obtained as above.

Result 15 lbs.

TEA ESSENCE.

Finest Ceylon tea	2 lbs.
Rose flower leaves	6 oz.
Genuine arrac	2 pints.

Allow to stand for one day, then add 2 gallons boiling water. After standing one hour express off 8 lbs. extract. Add further—

Lemon peel essence	12 dr.
Pineapple essence	1 lb.
Orange flower water	4 lbs.

FLEXIBLE ELECTRICAL INSULATION.

Mineral wax (paraffin)	1 part.
Wood tar	20 parts.
Shellac	32 „
Asbestos powder	32 „

Mix the ingredients together in a pan at a temperature of 58 to 100°C. For soft compositions the quantity of mineral wax may be considerably increased; whilst for harder compositions a portion of the asbestos is replaced by ground slate. Stir the mass until a thick paste is formed and then press into moulds of the desired shape, or rolled into sheets. If to be used for electrotype moulds, the mass is poured or pressed whilst hot into the patterns to be reproduced. In other respects the mass can be used for the same purpose and in the same way as other insulating compositions, for covering electric wires, etc. It is unacted on by water or atmospheric influences, it does not soften when heated to 64°C. and is quite insensitive to the action of dilute sulphuric acid of Sp. gr 1.6. Any scraps and used pieces of the mass can be melted down again.

INSTANTANEOUS BLACK STAIN FOR TANNERS.

Ceresine	9 parts.
Crude wool fat	22½ „
Tallow	10 „
Olein	23½ „
Vaseline oil (Sp. gr. 0.885)	70 „
Nigrosine (oil soluble)	15 „

Melt the ceresine, wool fat, and tallow all together and then stir in by degrees the olein and vaseline. When well mixed, take away the mass from the fire and dissolve the nigrosine in it by stirring. Pack the product in tins.

FLOOR POLISH.

Soft paraffin	10 parts.
White ceresine	2 „
Yellow palm-oil	2 „
Asbestos powder	2 „

Melt the first three ingredients over slow fire and mix the asbestos. Stir the whole until nearly set, and then pour into moulds.

(Continued from page 379)

parts of triethanolamine, 202 of stearic acid and 124 of snow floss. After this add directly to the revolving wheel a compound of 144 parts of rosin, 10 of calcium hydroxide, 23 of cup grease and 204 of fine pumice. Polishing operations are generally divided into rough finishing and fine polishing. Fine scratches and tool marks may be removed by buffing on muslin wheel. For removal of rough edges sewed muslin buffs lubricated with cake prove satisfactory.

Fine polishing on the buffing wheel is done to wiping or bright lustre. For this purpose buffs are made from flannel instead of muslin.

BIBLIOGRAPHY.

1. Handbook of Plastics—Simonds and Ellis.
2. Synthetic Resins and Allied Plastics—R. J. Morrell.
3. Introducing Plastics—Kellaway and Meadway.
4. Modern Plastics—Harry Barron.
5. Plastics In Industry—Plastics.
6. The Making and Moulding of Plastics—L. M. T. Bell.
7. Plastics For Industrial Use—John Sasso.

Brief Queries and Replies

2763 B.D.G., Kanpur—Process of manufacturing jelly will appear in an early issue of Industry. For medical books enquire of Thacker & Co Ltd., Rampart Row, Bombay and International Book House Ltd., Ash Lane, Opp. Clock Tower, Fort, Bombay.

2765 V.T.C., Thiruvattur — Process of manufacturing camphor tablets will appear in an early issue of Industry.

2768 T.N.S.C., Jubbulpore — Process of manufacturing iron and steel bars, sheets, etc., will appear in an early issue of Industry.

2771 K.C., Jhansi—Glasswares and crockery may be had of A. M. Dadabhoy, 55, Canning Street, Ali Mohamed & Co., 27, Old China Bazar Street and Bepin Behari Paul, 9, Old China Bazar Street; all of Calcutta. Aluminium wares may be had of Shankarlal M. Jamandas, 53-3, Canning Street and A. M. Dadabhoy, 55-7, Canning Street; both of Calcutta. Toy and sporting goods have good prospect. Umbrella fittings may be had of Bhimraj Jitmal Rup Metal Industries, 6, Karbala Md. Street, Calcutta.

2776 V.N.S., Erode—Process of manufacturing methylene blue and congo red will appear in an early issue of Industry.

2777 K.N., Moradabad—For spinning mill and hosiery machine enquire of W. H. Brady & Co., Ltd., Mercantile Bldgs., Lall Bazar, Calcutta.

2779 N.N.P., Nugegoda—Process of manufacturing wood polish, browning gun barrel, etc., will appear in an early issue of Industry. Indian Optical Institute & Refraction Hospital, 7 1C, Lindsay Street, Calcutta imparts instruction on applied optics.

2781 B.L., Chheharta—Your enquiry regarding Chinese blue is engaging our attention.

2789 S.W., Madras Powdered benzoin is used as a fixing agent. You should calculate 16 oz. make one lb. You may apply gold laquer to tin container Kieselguhr may be had of Calcutta Mineral Supply Co., Ltd., 31, Jackson Lane, Calcutta. Refined oils may be had of Swaika Oil Mills. 28, Pollock Street, [illegible] Perfumes may be had of Ghose Broth[illegible] Ezra Street, Calcutta. There is no [illegible] in manufacturing medicine, tooth pow[illegible] toilet articles. Following is a formula [illegible] lacquer: Shellac 5 oz.; Turmeric 2 oz.; [illegible]boge 2 oz.; Dragon's blood 4 dr.; Me[illegible] spirit 3 pints. Dissolve the ingredient[illegible] thylated spirit and apply the lacque[illegible] articles which should be thoroughly [illegible] with soft soap and hot water and warm[illegible]

2790 L.C.L.B.B.L.J., New Delhi—[illegible] start manufacture of utensils from b[illegible] and alminium sheets. For machines [illegible] Alfred Herbert (India) Ltd., 13-3, Stra[illegible] Calcutta.

2791 I.P.F.P., Delhi—For collect[illegible] dresses you should consult director[illegible] taking license of medicine write to D[illegible] mittee, New Delhi.

2794 M.D.M., Lucknow—Proce[illegible] facturing baloon, alta, confectionery, [illegible] appear in an early issue of Industry.

2795 P.P.G., Daurala — You [illegible] manufacture of disinfectants with Rs [illegible]

2797 S.H.B.D., Ahmedabad — R[illegible] ring worm lotion, antiphlogestin etc [illegible] an early issue of Industry.

2804 P.T.J., Cochin—Process of [illegible] turing duplicator, and stamp pad [illegible] appear in an early issue of Industry.

2807 K.A., Anakapalle—For [illegible] machine enquire of Marshall Sons & [illegible] 99, Netaji Subhas Road, Calcutta and [illegible] Toubro Ltd., 8, Royal Exchange Place, [illegible]

2825 H.H., Natore—Process of [illegible] turing rubber stamp will be found in [illegible] ture of Rubber Goods published from [illegible] price Rs. 3|6|- including postage. Rub[illegible] making equipment may be had of B[illegible] Co., 156, Cornwallis Street, Calcutta

2826 B.S.R., Udipi—Process of [illegible] turing lemon grass oil, pepsin and ros[illegible] will appear in an early issue of Industry.

2827 S.K., Jullundur City—Foll[illegible] a formula of boot polish: Shellac wax [illegible] Beeswax 1 lb.; hard paraffin 2 lbs; soft [illegible] 1 lb.; turpentine oil 1½ gallons. oil sol[illegible] 1 oz. Melt the wax over slow fire in [illegible] iron pan. Next add the soap and heat [illegible] solve. Then slowly stir in the turpent[illegible] when thoroughly mixed extinguish the [illegible] go on stirring until the mixture be[illegible] thicken. At this stage pour in tins. F[illegible] use nigrosine oil-soluble, for tan use [illegible] mahogany and for brown Bismark brow[illegible] formula of green fountain pen ink appeared [illegible] October, 1948 issue of Industry.

2830. S.O.H., Gaya—You may [illegible] candle factory with Rs. 2000|- Candle [illegible] machine may be had of Small Machineries M[illegible] Co., 22, R. G. Kar Road, Calcutta. Hard pa[illegible]

is used as raw material. Paraffin is melted and poured in the machine fitted with wick.

2832. B.N.O., Katrasgarh—You may put film in washing soda solution for 24 hours then wash. Hercules cycles may be had of Bentick Cycle Co., 1, Chowringhee Road, Calcutta. For Photo printing glass enquire of Calcutta Photographic Stores & Agency Co., Ltd., 154, Dharamtola Street, Calcutta. Rotten stone may be had of Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane, Calcutta.

28.. P.K., Ajmer—For thread making machine enquire of W. H. Brady & Co. Ltd., Mercantile Bldgs., Lall Bazar, Calcutta. For glazed thread enquire of Acme Thread Co., 37, Canning Street, Calcutta.

28.. O.P.V., Calcutta—Process of manufacture of ultamarine blue will be found in Chemical Industries in India, published from this office price Rs. 3|6|- including postage. It is mainly imported from foreign countries.

28.. K.L., New Delhi—You may consult the Synthetic Dyestuffs, by J. C. Cain and J. S. Thorpe.

..1 R.D.S., Bulsar—Process of manufacturing celluloid will be found in September 1948 issue of Industry. We have no book on celluloid manufacture. For the book on celluloid manufacture, enquire of W. Newman & Co. Ltd., 3, Old Court House Street, Calcutta. As far as we know there is no factory in India manufacturing celluloid at present. Celluloid in small chips may be dissolved in amylacetate and acetone. You have to secure permission from the Govt. of India for starting a celluloid factory.

28.. A.S.D., Allahabad—You may use salicylic acid for preserving gum mucilage.

28.. A.S., Delhi—Recipes of resin stick and [illegible] dona stick will appear in an early issue of Industry.

28.. S.B.K., Nandgaon—Dairy machines may be had of Edward Keventers Ltd., 11-3, [illegible] Street, and Volkart Bros., 8, Netaji Subhas Road, both in Calcutta.

28.. R.K., Farrukhabad—Details regarding [illegible] research is not available.

28.. E.H.T.C., Bombay—Barium sulphate is used in paint, duplicator etc. Magnesium carbonate and boric powder are used in tooth powder. Benzyldehyde is used as flavouring agent.

28.. K.L.S., Delhi—Process of silvering mirror will be found in Independent Careers for the Young, published from this office, price Rs. 3-6 including postage.

28.. M.B.K., Bowringpet—You may start candle manufacture, washing soap manufacture, phenyle manufacture, etc. with Rs. 3,000. For manufacturing candles you require candle moulding machines, wick and hard paraffin. For soap manufacture you may consult "Manufacture of Soap", published from this office, price Rs. 3-6 including postage.

2874 B.K.T., Jaipur—Process of manufacturing nitric acid, will be found in Chemical Industries of India, published from this office, price Rs. 3-6 including postage.

2876 M.S.M., Vizianagram—Formulas of sparklers, appeared in November 1948 issue of Industry. Wants to be put in touch with the suppliers of gund and scale brand burners, unbreakable sheet glass, etc.

2877 S.M.D., Ambala Cantt.—Following is the process of bleaching shellac:—Boil ordinary shellac in a weak solution of carbonate of potash until it is dissolved, then pass the chlorine gas through the solution when the lac is thrown down free colour the resin is collected, washed with warm water, melted over water and by washing with the handles, made into the form of more or less twist cylindrical places having a marked fibrous structure. Following is a formula of solid phenyle. Tallow 8 lbs., rosin 8 lbs., creosote oil 5 lbs., caustic soda lye (66°TW) 9 lbs. Melt tallow and rosin together, then stir in the caustic soda lye when the transparent jelly like mass is formed, remove the pan from the fire and stir in the creosote oil. Then put the mass into a rectangular tank to cool. When cold cut into small cubes. Following is a formula of red sealing wax. Shellac 14 parts, rosin 24 parts, vermilion 1½ parts, barytes 14 parts; whiting 4 parts, turpentine 4 parts. Melt the shellac and rosin over a slow fire, keep hot and work in the pigments. Lastly add the turpentine oil. Cast into stick. For bleached lac enquire of Banshidhar Dutt, 126, Khengrapatty Street, Barabazar, Calcutta. You may use linseed oil for dissolving red lead.

2883 B.S.R., Mudbidri—For bellmetal utensil write to Chandra Mohan Singh, Khagra, Murshidabad and Sashi Bhushan Provapada De, 62, Netaji Subhas Road, Calcutta.

2887 S.M., Bareilly—For taking agency of cigarette and tea, you should communicate with the firms dealing in those articles.

2888 M.S., Yairipok—Following is a formula of writing ink:—Tannic acid 1.55 oz. Gallic acid 0.5 oz. Ferrous sulphate 2 oz. Hydrochloric acid 1i67 oz., Phenol or carbolic acid 0.13 oz. Ink blue 0.47 oz. Water to make 1 gallon. Dissolve the tannic and gallic acids in about 3 parts of hot water and add to it the dilute hydrochloric acid (of about 70°Be) and then add the solution of ferrous sulphate, and phenol in

another 2 parts of hot water. Bring up to 1 gallon, mix well and let stand quietly for 16 days. Then decant without stirring up any sediment formed. Finally dissolve the blue and strain through cloth before bottling.

2900 I.C.M.C., Bhadohi—Formulas of scented hair oil and washing soda will appear in an early issue of Industry.

2902 R.B.V., Bombay—For preserving infusion you should use alcohol in the proportion of 1 : 3 i.e. 1 part alcohol in 3 parts of infusion.

2904 Z.B., Malda—For starting an ice cream factory, you should invest at least Rs. 25,000 for machines enquire of Refrigerators (India) (Ltd.), 59-E, Park Street, Calcutta, and M. S. Vernal & Co., Bharat Insurance Bldgs., Chittaranjan Avenue, Calcutta. Process of manufacturing ice cream will be found in Manufacture of Syrup and Cold Drinks, published from this office, price Rs. 3-6 including postage.

2906 A.A.N., Madura—Candle making machine may be had of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta. Hard paraffin is melted and poured into the mould fitted with wicks.

2907 S.C.G., Bijnor—Process of manufacturing sodium silicate will appear in an early issue of Industry.

2910 P.M.V., Gujranwala—For dies and sheet metal stamping machine, enquire of Alfred Herbert (India) Ltd., 13-3, Strand Road, Calcutta.

2921 M.L.U., Dehra Dun—For stone cutting machine enquire of Marshall Sons & Co., Ltd., 99, Netaji Subhas Road, Calcutta. Process of manufacturing stone slates and tin slates will be found in "Manufacture of School Slates" published from this office, price Re. 1-14 includin postage.

2927 A.P., Gaya—We have no book on candle manufacture. Candle manufacturing machine may be had of Small Machinery Mfg. Co., 22, R. G. Kar Rd., Calcutta. Hard paraffin is melted and poured in the machine fitted with wicks.

2930 K.B.P., No address—You may start a laundry business. For laundry machines enquire of Jessop & Co., 93, Netaji Subhas Road, Calcutta, and Larsen & Toubro Ltd., 8, Royal Exchange Place, Calcutta. Cinema machine and equipment may be had of Empire Talkie Distributors, E. T. D. Bldgs., 98 E Chowringhee Sqr., Calcutta and French Universal Talkie Equipment, 36, Dharamtola Street Calcutta. For learning Radio Engineering, you may write to College of Wireless and Commerce, 212, Bowbazar St., Calcutta. For learning art you may write to Indian Art School, 250 Bowbazar St., Calcutta. You may start a cinema house in Calcutta with Rs. 4 lakhs.

2931 G.C.S., Dehra Dun—For wirenets enquire of Indian Wirenetting Factory, 24, Sastitala Road, Narkeldanga, Calcutta and Bharat Wirenetting Stores, 113, Netaji Subhas Road Calcutta.

2934 A.C., Champanagar—Yes, you may start nail manufacturing, candle or soap manufacture with Rs. 5,000.

2939 A.E.W., Nasik—Process of manufacturing batteries will appear in an early issue of Industry.

2941 B.P., Sambalpur—For wooden blocks, enquire of Bharat Chitralaya, 355, Upper Chitpore Road, Calcutta.

2942 S.S.W., Conjeeveram—Simple method of manufacturing textile soap will appear in an early issue of Industry. You may refer your difficulties to us when required.

2943 S.R.S., Kalimpong—We have no book on Photography, watch repairing and signboard painting etc. You may however, consult cotton Dyeing and Printing, price Rs. 3 and complete Tailoring price Rs. 4 both the books published from this office. For learning photography, you may write to Indian Art School, 250 A, Bowbazar St., Calcutta. No institution where watch repairing and signboard painting are taught is known to us.

2945 E.A.S., Trivandrum—You may start ink, soap toilet goods, boot polish manufacture on small scale as cottage industry basis.

2948 G.R.V.S., Chandausi—Process of manufacturing brahmi-Amla hair oil will appear in an early issue of Industry.

2949 A.P.J., Tatna—One metric ton is equal to 26.79,228 mds., one short ton is 2,000 lbs. and one gross ton is equal to 2,240 lbs.

2950 K.S., Cuddalore—For starting manufacture of activated carbon you have to invest Rs. 25,000. Process of manufacturing glass will appear in an early issue of Industry.

2951 P.D.N., Aska—Candle moulding machines may be had of Small Machinery Mfg. Co., 22, R. G. Kar Road, Calcutta. Paraffin wax may be had of Burma Shell Oil Storage & Distributing Co., Ltd., Hongkong House, Dalhousie Sqr., Calcutta. Stearic acid may be had of Calcutta Chemical Co., Ltd., 5, Bonfields Lane, Calcutta. Bed bug powder should be used as it is. Artificial silk thread is used in manufacturing mantles. Flour mill machines may be had of Balmer Lawrie & Co., Ltd., 103, Netaji Subhas Road, Calcutta.

2952 N.A.W., Ludhiana—Following is a list of hosiery dealers:—A. K. Paul & Co., 199-1,

Harrison Road; Dass Bros., 45, 46, Chandni Chowk and Dutt & Co., 11-A, Russa Road, all of Calcutta.

2955 I.C.T.C., Poona—For starting a soap factory you have to invest Rs. 10,000. Soap making machines may be had of Small Machinery Mfg. Co., 22, R. G. Kar Road, Calcutta. Machines will cost you about Rs. 3,000 and another Rs. 3,000 will be required for purchasing raw materials. Remaining Rs. 4,000 will be reserved fund. Soap making material may be had of Calcutta Mineral Supplying Co., Ltd., 31, Jackson Lane, Calcutta. You will get 15 to 20 p.c. profit on the outturn.

2956 S.C.W., Bellaary—Process of manufacturing coffee tablets will be found in March 1948 issue of Industry.

2960 R.C.P.C., Hoshiarpur—Following is a recipe of Bindi: carmine 5 parts; gum arabic 8 parts, water 10 parts. Dissolve the gum in cold water and incorporate carmine. Other formulas you require will appear in early issue of Industry.

2961 G.V.R., Hapur—Following is a formula of gelatine capsule: Gelatine 400 parts, glycerine 100 parts. Mix and keep aside to dissolve. Next prepare in a separate vessel petroleum 0.02 part, Benzine 0.04 part. Then mix the two and form the capsules in a suitable mould. The capsules are kept in 3-5 p.c. formaldehyde solution. For dies enquire of Oriental Machinery Supplying Agency, Ltd., P-12, Mission Row Extn., Calcutta.

2962 D.U.G.A.L., Allahabad—A formula of scented hair oil appeared in December 1947 issue of Industry.

2964 R., Ellore—A mixture of oxalic, citric and tartaric acids, in equal parts, dissolved in just enough water to give a clean solution, acts energetically on most ink.

2969 R.I., Salem—Process of manufacturing Colloidal silica and sulphonatted fatty alcohol will appear in an early issue of Industry. For journal of foreign countries enquire of International Book House, Ash Lane, Opp. Clock Tower, Bombay.

2970 S.T., Calcutta—Your query is not in our line.

2971 A.S., Amritsar—Questions of industrial and commercial lines are replied by post on receipt of annas 8 stamps for each question. You may consult Mr. M. N. Mitter, M.Sc., 79 4 2-D, Raja Naba Kissen Street, Calcutta. Wants to be put in touch with the suppliers of paper bags in Calcutta or Bombay. Indigo may be had of Banshidhar Dutt, 126, Khengrapatty St., Calcutta. We are not aware of any homeopath who will give you advice free of charges. A formula of best polish will be found in November 1948 issue of Industry.

2973 S.A.N.S., Tuticorin—For potassium nitrate plant enquire of B. R. Herman & Mohatta (India) Ltd., 19, British Indian Street, Calcutta.

2974 D.P.D., Ambala—For oil engines enquire of Balmer Lawrie & Co., Ltd., 103, Netaji Subhas Road and Francis Klein & Co., Ltd., 1, Royal Exchange Place; both of Calcutta. Process of manufacturing printing ink and oil colour will appear in an early issue of Industry.

2976 A.P., Calcutta—Bye product left after manufacturing Vanaspati may be utilised in manufacturing soap. No other use is known.

2982 R.P.T., Japla—There is no institution where you may learn tile and brick industries. Double-boiled linseed oil is used in manufacturing paints and varnishes. Linseed and mustard cakes have no other use.

2986 B.S.M., Bombay—A good formula of washing soap appeared in September 1948 issue of Industry.

2987 S.R.R., Langling—For starting a cardboard factory you have to invest at least Rs. 1 lakh. For machines enquire of Francis Klein & Co., Ltd., 1, Royal Exchange Place, Calcutta.

2989 K.L.S., Mandsaur—It is not possible to recharge dry cell and also to recharge fused electric bulb.

2990 K.K., Coimbatore—Diamonds are available in outh Africa.

2993 S.V., Lucknow—Process of manufacturing all kinds of marking ink will be found in Manufacture of Ink published from this office, price Rs. 3-6 including postage. Process of manufacturing empire cloth will appear in an early issue of Industry.

2994 I.H.S., Cawnpore—Your queries are not in our line.

2995 P.S., Bikaner—Following is a formula of cantharides 5 oz.; sandal oil 15 dr.; alkanet root 15 dr.; otto of hena 5 dr.; oil rosemary 10 dr. First of all the oil is treated with alkanet root and allowed to remain undisturbed for 2 days for colouring. Then strain the oil through cloth. The fly cantharides are next fried in about one chhatak of fresh sesamum oil and when these are well fried and discoloured, these are allowed to cool. Afterwards the previously coloured oil and the balsam peru (after melting it over a slow fire). Finally add the other ingredients one by one with constant shaking.

3002 N.S.C., Batala—You should advertise in educational periodicals, i.e., magazines read by students community. You may also adver-

tise in the Statesman and A.B. Patrika of Calcutta.

3003 H.P.B., Baroda—Thank you for your valuable suggestion. Rosin when used in soap produces good lather.

3005 V.V.M., Vizagapatam—A formula of tooth powder will appear in an early issue of Industry.

3009 M.C.K.C., Coimbatore—Following is a list dye merchants:—Ciba (India) Ltd., Jehangir Bldg., Esplanade Road, Fort, Bombay; National Aniline & Chemical Co., Patel House, Churchgate Street, Fort, Bombay; Champalal Agarwala, 45, Armenian Street, Calcutta; Hansraj Vishram & Co., 2A, Armenian Street, Calcutta; Delhi Colour & General Works Ltd., Subzi Mandi, Delhi; Mohamedally Abdoolobhoy, Main Road, Shevapet, Salem and Colour Trading Co., South Masi Street, Madura.

3013 R.K.M., Lucknow—Casein may be had of Polson Ltd., Lloyd Bldgs., Dougall Road, Ballard Estate, Bombay and Pannalal Kishorilal, Mainpuri.

3017 J.M.S., Delhi—Tin cans may be had of Bengal Tin Box Mfg. Co., Ltd., 1, Jadu Nath Mitter Lane, Calcutta 4. Raw materials for phenyle manufacture may be had of Calcutta Mineral Supply Co., Ltd., 31, Jackson Lane, Calcutta. Following is a recipe of an ointment: Sulphur 1 oz.; zinc oxide 3 oz.; kaolin 1 oz.; benzoated lard 8 oz. Mix and put in cans. Following is a recipe of louse killer: sulphur 1 oz.; carbolic acid ½ oz.; crude naphthol 1 oz. and powdered chalk 1 lb. Mix.

3026 S.A.S.R., Karaikudi—Tungsten is used in making filament of electric bulb. Fused filament has no use. For polishing ground glass you may use emery wheel. Ordinary furnace will soften and bend glass pieces. For punching machines you may enquire of Francis Klein & Co., Ltd., 1, Royal Exchange Place, Calcutta. Wants to buy 1,000 volt fused electric bulb in 1,000 lot.

3034 D.V.C., Jamnagar—Process of manufacturing cement abestos sheets, calcium, carbide, ultramarine blue, etc., will appear in an early issue of Industry.

3042 C.T.A., Bhavnagar—For industrial books enquire of Thaker Spink & Co. (1933), Ltd., 3, Esplanade East, Calcutta and Standard Literature Co., Ltd., 13-1, Old Court House Street, Calcutta.

3045 K.H.S., Ahmedabad—For spinning and weaving machines enquire of W. H. Brady & Co., Ltd., Churchgate Street, Fort, Bombay. The firm will supply you with an estimate for starting a factory. For electric bulb manufacturing you require glass and other metals such as tungsten, zinc, copper, etc. In this connection you may consult Electric Lamps and Electric Lighting by J. A. Fleming. As regards technician you should advertise in newspapers. For making candles you require hard paraffin, stearic acid and wick. For machines write to Small Machineries Mfg. Co., R. G. Kar Road, Calcutta.

3046 S.K.I., Madura—Boards may be made from saw dust using glue as binding agent and applying heavy pressure. We have no book on the above subject. Following is a recipe of iron cement. Make iron filings to a paste with sodium silicate. We have no book on working machines. You may however enquire of W. Newman & Co., Ltd., 3 & 4, Old Court House Street, Calcutta.

3052 S.S., Kalagachia—Following is a recipe of vermilion: Red lead 8 lbs.; zinc 5 lbs.; venetian red 1 lb.; vermilion dye. Macerate these ingredients thoroughly in stone mortar and set aside for 24 hours in cool place. Finally pound it and pack.

3053 I.M.K., Shikohabad—Following is a process of refining kerosene oil: One of the easiest method of refining kerosene oil is passing the oil through a bed of bauxite, fuller's earth and then through a bed of Glauber's salt. By these treatments the oil becomes perfectly white. Treating vegetable oil with animal charcoal is the usual way of refining vegetable oil. For glass [illegible] enquire of Allahabad Glass Works, [illegible] Allahabad and Hindu Glass Works, Na[illegible]

3059 L.B.D.N.M., Kangra—You may enquire of the following firms for the machines required: Standard Machinery Co., 86B, [illegible] Subhas Road, Calcutta and Harima Engineering Works, 69, Belgachia Road, Calcutta. [illegible] nail making machines may be had of [illegible] Machinery Supplying Agency Ltd., P12, [illegible] Row Extension, Calcutta and Francis Klein & Co., Ltd., 1, Royal Exchange Place, Calcutta.

3060 T.M.B., Tuticorin — For directory of foreign countries enquire of International Book House, Ash Lane, Opp. Clock Tower, Bombay. Raleigh cycles may be had of Raleigh Cycle Co. Ltd., Lenton Boulevard, Nottingham, England. For required cycles enquire of Bentinck Cycle Co. Ltd., 1-2, Chowringhee [illegible] Calcutta and H. D. Nundy & Co., 50-6, Dharamtala Street, Calcutta. Paper may be had of Bholanath Dutt & Bros., 60A, Mirzapur St., Calcutta and Raghunath Dutta & Sons, Harrison Road, Calcutta.

3061 F.R., Puri—Laundry machines may be had of Larsen & Toubro Ltd., 8, Royal Exchange Place, Calcutta.

Review of Books

STATISTICAL ABSTRACT; WEST BENGAL 1947. Published by Provincial Statistical Bureau, West Bengal, Writer's Buildings, Calcutta Pages 199.

The Statistical Abstract, as the very name suggests, primarily deals with figures relating mainly to the administrative and economic aspects of this new born province of West Bengal. The task, it is obvious, has been highly tremendous and we have a genuine and warm appreciation of the strenuous labour that it must have involved.

Originally, official reports and records were the storehouse of statistical information. But partition has upset everything. In fact, we have to revise and rearrange everything in exact form. Immediately after partition, the absence of correct statistical figures was a great vacuum, thus making the normal functioning of administrative machinery extremely difficult. The necessity for figures was keenly and increasingly felt. And these ultimately led to the publication of this useful book.

This book, we believe, will facilitate administration and will also, to some extent, help the correct formulation of policies with regard to such vital and fundamental matters as Agriculture, Labour, Industry, Revenue and Expenditure.

Students of Economics who want to keep the economy of West Bengal at their finger tips, may find in it quite a reliable and dependable guide. This Statistical Abstract is highly comprehensive embracing in it a wide range of subjects such as Area and Population, Medical, Agriculture, Irrigation, and Meteorology, Prices, Elections and Administration of Police etc, Jails, Education and Press, Labour and Industries, Trade—in fact, everything that vitally concern the welfare of this tiny province. Director, N. Chakravarty invites fresh suggestions from interested quarters regarding further improvement in the standard of this highly valuable book.

We hope, he will get a quick and sympathetic response from all quarters.

SYMPOSIUM ON POST-WAR EDUCATION IN INDIA. Published by Padmaja Publications, Baroda. Pages 124, price Rs. 4-8.

The Sergeant scheme has created a profound stir among the intellectuals of our country because on the right evaluation of the scheme in its entirety and in its minute details hangs the destiny of the nation. And it is high time that the basic proposals envisaged in the scheme should be carefully analysed before they are finally implemented.

This 'Symposium, is therefore aimed at an examination of the scheme prepared by the Central Advisory Board. It reflects different reactions and outlook of some of the outstanding intellectuals in our country. Their writings on such a weighty and grave subject have the unmistakable stamp of sincerity; depth and originality. They are all highly informative, thought-provoking and illuminating focussing our attention on the fundamental proposals, their merits and demerits.

Nobody has, however, anything to say against the fundamental conception on which the scheme is mainly based. The fundamental conception is that it is the obligation of the Government to provide all its citizens with a minimum preparation for citizenship in the form of free compulsory education. Free compulsory education is the sinequanon of a secular, democratic state. And in this context of our newly-won political freedom, the scheme for universal education brooks no delay. Then a selective process will operate. Only those students who show early promise of talent and brilliance will have to be selected for higher secondary education whatever may be their pecuniary conditions. No child by reason of poverty or disinclination of parents should be debarred from benefits of higher education. The present system of education is, we know, diverced from the realities of life. But suggestions have been made in this particular book to correlate education to the social, economic and cultural life of India.

The scheme further embraces such vital matters as medical examination, treatment of school children including proper nutrition, physical training and encouragement of social facilities.

With matters of such vital and fundamental importance none can disagree. But some of these writers have doubted the practicability of the scheme on several specific grounds. They have raised their objections with regard to time-factor, exhorbitant cost, that the scheme involves. But whatever may be the objections, we are bound to conclude that Sergeant

scheme is the best possible to begin with. K. G. Saiyaddin has tried to answer some of these objections in the introductory chapter of Symposium.

The eminent writers who have contributed to this Symposium include such outstanding personalities as Sir Maurice Gwyer, Dr. G. D. Boaz, J. M. Mehta, Dr. B. C. Lela, Principal R. V. Parulikar and Dr. V. V. Kamat.

The book deserves the careful perusal of the intelligentsia. We commend it to our readers.

WAGES AND WAGE POLICY. Published by the Universal Publishers Ltd., The Mall, Lucknow (India). Pages 94, price Rs. 2.

Post-war economic crisis in India may be summed up in the following words :—The price of commodities keep their upward swinging. And it is difficult to predict how long this state of affairs will continue. Post-war deflationary trends have not as yet manifested themselves. But they are apprehended at any moment. The result is that while businessmen oppose any sort of wage-increases in view of anticipated deflation, the soaring prices automatically force the workers to demand more wages. Thus conflicts arise and lead to strikes and lock-outs.

In this context the author strongly urges in favour of a thorough reorganisation and systematisation of wage-system. Because in view of this industrial crisis Wage is of vital and fundamental importance. The author is of opinion that unless we have made a scientific approach to this problem, there is hardly any prospect of increased production which is the pressing need of the hour.

The author deplores the fact that no official machinery has yet been set up to solve this knotty problem.

A scientific wage-system is of urgent importance from two considerations. Firstly, it will go long way to pacify the wide-spread labour unrest, thus ensuring increased production. Secondly, it will increase efficiency of Indian labour. The author undertakes a dispassionate study of the labour conditions prevailing in the major industries, and indicate the lines along which a thorough-going revision and reorganisation of the wage-system may be carried out. The suggestions, he has made in this connection, may be briefly stated as follows:—(1) Institution of a Wage-Board, which should lay down the standard rates of payment for the different catagories of workers in all industries and revise wage-rates whenever conditions warrant such revision. (2) a thorough standardisation of wage-rates under the supervision and guidance of Wage-Board (3) provision for minimum wages and (4) a comprehensive machinery to supervise and carry out the programme of reorganisation of the entire wage-system.

In the concluding paragraph, the author fervently appeals that programme should be made not only in paper, but should be thoroughly implemented. It is only through a co-ordinated and well-planned policy of wage payment which ensures fair deal both to workers and employers, that we can achieve greater efficiency and higher wage leading to an all-round prosperity and peace.

The book thus endeavours to throw light on some of the baffling problems of our national economy and suggests a way out. We commend this book to our readers.

NOTICES & REVIEWS

(Manufacturers sending specimens and samples of their products for notice and review may please note that no notice is published of medical preparations and allied substances in this section.)

FOUNTAIN PEN INK.

We have received from Asoka Inks, Tenali, (Guntur Dt).,—3. Madras one sample phial of "Asoka" ink, which is found to be good.

WASHING SOAP.

We are glad to receive from Maya Soap Works, P.O. Itwari, Nagpur, two cakes of washing soap manufactured by them. We have tested the soap and found it quite satisfactory

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...d by K. N. Banerjee, for Industry Publishers Ltd.,
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ROAD TRANSPORT IN INDIA.

IN this vast continental country like India, predominantly agricultural and with its industries, struggling to develop, easy and rapid road-communication claims priority to any other development programme. Villages, in India, still look like so many scattered human concentrations unconnected with one another, baffling all attempts of planned and co-ordinated development.

An adequate road-system, therefore, is the need of the hour. And it is hoped that developed on sound and proper lines, it will not only remove one of the chronic deficiencies of our country but will also fulfil our urgent requirements, unlocking the country's vast potential agricultural and industrial production, ensuring free and easy movement of food grains from the surplus to deficit areas and thus affording the best method of fighting inflation.

An adequate road-system, in India, will in various ways quicken the economic activity of India. Firstly, it will promote and stimulate agricultural production, facilitating easy and quick transportation, bringing wide markets within its easy access and thus fostering the economic prosperity of the country as a whole. Secondly, the large forest wealth of India which lies unexploited, can be exploited effectively with the help of suitable road transport.

Thirdly, so far as its effects on industry are concerned, an expanded road-system will surely give a new lease of life to our handicrafts and subsidiary industries which have languished largely due to lack of easy and quick transport. And it is quite logical to suggest that Japanese roads constitute a real factor in the quick prosperity of her cottage industry. In India too, roads will be of particular assistance for the development of her industries, connected with the preparation of agricultural produce for export or internal consumption. They may thus bring within bounds of possibility the establishment of " Garden factories " and evolve a form of industrialism most suitable to the needs of Indian worker who thrives best in a rural environment.

So we strongly feel that a network of arterial and feeder roads is what the country requires at this stage for an all-round development.

Current Topics

MARKETTING CONFERENCE IN NEW DELHI.

The tenth marketting conference was held recently in New Delhi to consider certain problems relating to marketting of agricultural products. These periodic sittings may help us immensely to find out the grave drawbacks of agricultural marketting.

Important resolutions were passed in this conference after a two-day delibera-tions of the various problems that ham-pered the growth and development of marketting on sound and progressive lines.

The first resolution related to intro-duction of standard weights and measures all over India and necessary machinery for their encouragement. Lack of unifor-mity creates a good deal of confusion and complications thus preventing the growth of a sound internal marketting. So pend-ing the recommendations of Standard In-stitute the Provincial and State govern-ments should initiate and enforce standard weights and measures. As a matter of fact it is the Provincial authorities who can best tackle this problem of enforcement to the highest pitch of efficiency. In the mean time the Government will have to take particular care that unnecessary and wasteful deplication of work is avoided. The recommendation of this conference is best possible from all considerations. because it provides a means for decen-tralisation and at the same time ensures the development of an integrated admini-stration.

Quality control and grading is one of the basic and primary needs for creating a favourable impression on foreign mar-kets. Repeated exhortation has simply failed to produce any effect. The problem by itself brooks no delay. The confer-ence have therefore done well in recommending the Government to pass legislation and pending such legislation extend the present Agmark grad-ing scheme especially to vegetable oils and vegetable seeds. The second resolution, adopted in this confer-ence, relates to step that may be taken to prescribe standard contracts on an All-India basis for important commodities. Such a course will not only lead to an improve-ment in quality but also in a large measure facilitate business operation between dis-tant markets. Industrial trade-associa-tions, may be summoned to confer whether a standard contract term may be generally adopted.

The third resolution, suggested inter alia, relates to (1) construction of feeder roads for easy and rapid transport of agri-cultural produce (2) introduction of uni-form rates in Railways and steam-ship for different classes of goods.

The last resolution is extremely im-portant. It emphasised the need of orga-nisation of co-operative society for grad-ing, processing and marketting.

POWER ALCOHOL PRODUCTION IN INDIA.

In India Power Alcohol industry has vast potentialities. But no systematic and sustained endeavour has been made to develop these latent possibilities. So nothing substantial and tangible has yet been attained. In recent years, however, the Central Government seem to evince keen interest in the increased productions and use of Power alcohol. With this end

in view, they have decided to convene a joint Conference of Provincial and State Governments to devise ways and means how to foster this important industry.

Increased alcohol production and increased consumption will lead to utilisation of Molasses, an important by-product of sugar. Besides, it will adequately compensate the deficiency of petrol-fuel by providing a suitable substitute and auxiliary source of Motor fuel, which is in short fall in this country.

The imports of spirit into this country amount to 180 million gallons and aviation spirit 18 millions. The internal supplies on the other hand amounts only to 18 million gallons per year. Self-sufficiency in our petrol requirements may not be attained in near future, as evident from the above figures. But it is quite possible to make up the deficiency by admixture of alcohol with Petrol-fuel in the proportion of 25: 5.

The recognition of their immense utility has led the Central Legislature to pas the Power Alchol Act by prescribing the proportions of 25: 5.

PROBLEMS OF ELECTRICAL INDUSTRY.

Government's plan for electrical development is a welcome step and is of vital and fundamental importance, owing to the pressing need of the country for rapid industrialisation and an improvement in the general standard of living. the plan, which Government have undertaken will cost Rs. 15 crores and will take nearly 5 years to be implemented. Besides this development plan, Government, are being advised on further allied plans for new hydroelectric schemes. We may reasonably hope that with these schemes in hand, an appreciable percentage of India's potentiality for power may be tapped within 20 years.

But there are several problems in electrical industry which have to be tackled beforehand, if it has to make the slightest headway. Mr. Gurjar, President of Indian Electrical Manufacturers Association, has thrown light on some of these problems which are hampering the speedy development of this industry as a whole. The problems relate to difficulties in the procurement of raw materials, namely Electrical Steel Sheets, Machine Screws, varnishes and enamels. Without adequate supplies of these raw materials, steady progress of this industry is well-nigh impossible.

The shortage of electrical sheets, in particular, is extremely acute. The Tata Iron and Steel Company produces nearly 18,000 tons of steel sheets per annum. The projected expansion in Tata Iron & Steel will lead to a further increase of 32,00 tons per annum. This, too will meet only half the annual demand. As matters stand, we have no other alternative but to import this additional quantity of 6,000 tons.

So far as ball-bearings are concerned, the supply position is not so bad. Import position of this essential raw material has been sufficiently satisfactory. Mr. Gurjar, however pleads in favour of withdrawal of customs duty which adversely affects the production cost of finished goods. So ball bearings, he urges, should be allowed to go duty free for the interest of the industry.

Mr. Gurjar was very critical of Tariff Board's recommendations relating to import restrictions for foreign electric motors. As such, in the event of withdrawal of import restrictions the position of indigenous industry is likely to be highly undermined.

The above hurdles, being at least partially removed from its pathway, Electrical Industry, in India can easily grow from more to more and secure for itself a firm and stable-position both in home and foreign markets.

PROBLEMS OF HANDLOOM INDUSTRY.

Handloom Industry is highly important from two considerations. Firstly, it is the single largest cottage industry in India. Secondly, it constitutes one of the most important articles of export and is thus capable of yielding substantial benefit to our country.

It is, however, unfortunate that handloom industry, at present, bristles with difficulties and problems. The inevitable result has been that the progress of the industry as a whole has been handicapped in various ways. But the problems are such as can be easily eradicated.

Of the numerous problems with which handloom industry is confronted, the main problem lies in the inadequacy of yarn supplies. The gravity of the position was recently explained by Dr. B. V. Narayanaswami, the renowned Indian Economist, in the report of the court of enquiry into labour conditions. He revealed that the weaver gets but 12 days' work in a month and for the rest of the month he lies idle. This is undoubtedly a staggering revelation of sheer wastage of productive power and potentiality. This wastage can only be stopped when supplies pour in adequate quantities. It is evident therefore that the picture will completely change, if adequate supplies are within the easy access of the producers. Price of handlooms too will be automatically brought down to the advantage of both the producers and consumers. But even here do not end all the complications. There are other difficulties also, which have to be effectively tackled. Quite recently the weavers in Madras, complained that yarn is rationed out to them without any reference to their special needs and requirements. The extent and nature of their loss may be imagined when the peculiarities of this particular type of industry have been taken into consideration. The fact is that particular type of yarn is needed for particular type of handloom. Thus higher counts are needed for production of export goods, and lower counts for local-consumption goods. But as supplies of yarn are made indiscriminately, complications inevitably follow. The weavers especially trained in the production of export goods, are constrained to divert from their usual course and they produce local-consumption goods. The consequences are doubly disastrous. Firstly because these weavers can scarcely produce the requisite standard of local-consumption goods and secondly because, export trade is highly affected by such constrained diversion.

The aforesaid problems are easily capable of solution if Government can arrange a definite increase of yarn and organise the distribution in such a manner as to take into account the special needs and requirements.

EXPORT POLICY OF GOVERNMENT OF INDIA.

The export policy of Government of India has been subject to unmerited and ununiformed criticism from many quarters. So Hon'ble K. C. Neogy, Commerce Minister of Government of India, has thought it expedient to clarify the main principles of India's export policy, to avoid further misunderstanding and misinterpretations on this matter. In fact, it is only when the interested parties have appreciated the real position, they will cease to complain any more.

The task of the Commerce Minister, he explains, is a most unenviable one. Uneasy lies the head on whom devolves the grave responsibility of formulating a correct foreign trade policy. The Ministry have to adjust and reconcile many conflicting situations and interests and the

position becomes all the more difficult when they are deprived of even a sympathetic understanding and co-operation from all sections.

The Commerce Ministry, in India, are confronted with similar problems. They have to reconcile demands for foreign exchange—which is both strong and insistent, and an acute shortage of essential commodities in the domestic market. And it is encouraging to find that they have made best out of the worst situations. And Government's approach to this specific problem is the only correct approach that may be taken under similar circumstances. Judged in the light of three main considerations, e.g. Dollar Earnings, Preservation of Overseas Markets and Mutual benefit arising from Import and Export trade, Government's export policy seems to run on sound lines. So far as Dollar Earnings are concerned, the picture is gloomy indeed. To be forewarned, is to be forearmed. And Hon'ble K. C. Neogy sounded a grave note of warning "though the balance of trade position as a whole is satisfactory, that in respect of hard currency position is far from satisfactory". So every possible effort must be done to stimulate our exports in these directions. After referring to the fact that during the months from April to August, 1948, our shortage of hard currency was as much as Rs. 13 crores, Mr. Neogy warned that the actual deficit by the end of the year may be of a larger order. So to offset this setback it was of foremost importance to direct a major portion of these exports towards hard-currency areas. The next problem to be taken up, in order of priority in connection with export trade, is preservation of overseas markets in soft currency countries. It is highly desirable for the interests of this country that the traditional trade connection with these countries should by all possible means, be maintained. Hon'ble K. C. Neogy rightly observed that it takes a great deal of patience to establish one's goods in a particular market and all the good works may be marred by a sudden interruption and stoppage of supplies.

While urging in favour of a vigorous export drive to finance our essential imports, Government is not at all oblivious of our domestic needs and requirements. Intense export of those goods, in particular, in which we have a comfortable surplus is to be specially encouraged. But export in respect of such commodities as "Textiles" should by no means be unrestricted and unlimited, but should be allowed to such an extent as may be necessary for the preservation of overseas markets.

Thus it is obvious that export policy, formulated by India Government is based on the sound principles of export trade and a realistic appreciation of the exact situation in our country.

INDO-PAKISTAN TEXTILE AGREEMENT.

A new textile agreement, has recently been signed between the Government of India and Pakistan by C. C. Desai, on behalf of Government of India and Mr. G. Faruque on behalf of Pakistan. A survey of the main provisions of this new agreement will reveal the fundamental difference between this newly concluded agreement and the original agreements of March and May. The fundamental difference lies in the fact that while the May agreement listed both India's requirement of cotton and Pakistan requirements of cloth, in the latest agreement there is no reference to India's cotton requirements.

According to the terms of agreement concluded in May 1948, it was stipulated that Pakistan's requirement of cloth should be supplied at an annual rate of four lakh bales (one fourth of which would be in

the form of yarn) and that Pakistan should supply India's requirements of Pakistan cotton at an annual rate of 6½ lakhs bales. The present Textile Agreement, however, as already stated, makes a notable departure from the original agreements in as much as the supply of cloth to Pakistan is not, in any way, related to supply of cotton by the latter. It merely stipulates that Pakistan would purchase about 75,000 bales of cloth and 25,000 bales of yarn before 31st December, 1948. And during the months of January to June, 1949, Pakistan will be entitled to purchase cloth and yarn on a monthly average basis of 375,000 bales of cloth and 12,500 bales of yarn subject to a maximum of 45,000 and 15,000 bales of yarn in any one month. The balance of purchase if any, will be completed before the end of August 1949. If purchase of cloth during any month falls short of 375,000 bales, it has been agreed that the difference between the 375,000 bales and the quantity actually purchased would be carried forward from one month to another. And the quantity so carried forward from one month to another should not exceed 7,500 bales. Again it has been agreed that the total purchases of Pakistan should on no account exceed 45,000 bales inclusive of carry forward cloth. This rate is evidently higher than the previous ones. Thus if we closely analyse the text of the provision, it is evident that India's attitude as regards textile allocations to Pakistan has been highly generous. But we regret that this generous gesture on the part of Indian Government has not been properly reciprocated by Pakistan. Pakistan has, not in the least, recoiled from its original position. Besides, the "lapse clause" contained in the provision strongly contrasts with the spirit of accommodation shown by Government of India. Over and above these concessions, Pakistan will enjoy certain exclusive privileges in the shape of controlled ex-mill prices and a fixed quota of fine and superfine varieties. But no such facility has been reciprocated, because India has still to make her cotton purchases from Pakistan at uncontrolled prices.

A cordial and stable trade relationship can grow on the basis of a mutual understanding and appreciation of reciprocal needs and requirements and we hope that Pakistan will realise this fundamental truth and respond quickly and favourably to India's sympathetic gesture.

DEVELOPMENT OF COTTAGE INDUSTRIES.

The first session of the Cottage Industries Board, recently instituted by Ministry of Industries and Supply, was held in December 13 and 14, to consider its future plan and programme. Dr. Shymaprasad Mukherjee who presided over the session, elucidiated the vital functions, which this organisation is called upon to play in the shaping of our national economy. The functions of this organisation are fourfold, e.g., (1) to advise and assist Government on the organisation and development of cottage industries, (2) to examine how small-scale and large-scale industries may be co-ordinated, (3) to examine schemes of Provincial and State Governments and (4) to advise Government on the marketting of small-scale and cottage-industry products.

This Board will thus keep a continuous watch over cottage industries and play the true guardian of their interests.

TANNING REPTILE SKINS.

REPTILE skins of interest to the tanner include lizard, snake and alligator. The value of lizards depends on their markings. Distinctive markings are worth a good deal more than skins with little or no markings. The grain whether prominent or flat, fine or large, is considered in conjunction with markings. In the case of snakes, it is the scales which influence quality and, therefore, price. Smaller scaled snakes are to be preferred. As regards alligator only the hilly part is usable for leather. The hard bony scutes on the back are of no commercial value.

Lizard, snake, and alligator skins are available in various conditions dried, wet salted, dry salted, and cured by means of various arsenical preparations. In some cases the sun dried skins are smothered with naphthalene to prevent insect damage, and these are often particularly difficult to soak down and soften.

SOAKING.

The operation is of great importance, and unless carried through to its proper conclusion, future operations cannot be successfully completed. Some tanners use acid and some alkaline soaks, but the best and safest are the latter, taking care, of course, that undue swelling is avoided. If acid soaks are used, there is a grave risk of interfering with the subsequent bating process. The procedure best suited is to soak the goods in a pit containing 1½ lbs. fused sodium sulphide per 100 gallons of cold water. At the end of 8 hours they should be drawn out of the pit, the liquor well plunged up or otherwise agitated, and the goods thrown back again one by one. After 24 hours' soaking the skins should be ready for wet tumbling, using the polygon tumbler and processing for at least 20 minutes. A further soaking in strengthened sulphide, adding ⅛ lb. sulphide (dissolved in 20 times its own weight of water) per 100 gallons water is then necessary.

In 24 hours' time the goods should be really soft, but if they are still on the hard side, and they may be if badly cured, they must be worked in the tumbler for another shortspell. Sun dried skins, to which are attached a good deal of flesh and fat, especially the latter, which soaks into the skin and forms very obstinate patches, benefit considerably from this manual operation.

LIMING.

On no account should the skins be limed before thoroughly softening in the soak. It is quite impossible to hurry along this type of goods and attempts to do so usually end disastrously. Liming is best carried out in a paddle, making use of a mellow, or used lime to commence with, preferably one that has been used only once before. Use of a stale or old lime is unadvisable, as bacterial damage is liable to be excessive. Paddling in the used liquor should not be more than two hours a day. After three days the goods can safely be transferred to a fresh, sharp lime made up as follows:—

5 per cent hydrated lime } on dry weight of goods.
1½ per cent sodium sulphide } on dry weight of goods.

Some tanners add 5-10 per cent and claim that the addition reduces excessive swelling and improves the handle of lime goods; good results may, however, be obtained without the addition of any salt. Paddle for 3 hours a day for 7 days and then if the scales are loose and the flesh easy to remove, the skins can be taken out and worked over the beam. After fleshing the skins require hand scudding and reliming in a fresh saturated lime made up by mixing six per cent hydrated lime in a paddle of water, the percentage of lime

being based on dry weight of goods. It is advisable to re-lime for 3 days working the paddle for a maximum of 4 hours a day. It is necessary to rescud on completion of the liming process.

WASHING.

This is best carried out in large polygon drums through which a constant stream of cold running water is allowed to pass. Great care must be taken to avoid risk of knitting or balling up of the skins, especially snake, which is liable to be rather troublesome.

DELIMING.

This can also be carried out in a drum, using 1½ per cent borax on the limed weight, and drumming for 1½ hours.

BATING.

Any good enzymice bate can be used, employing approximately 4 per cent on the dry weight of goods. Either a slow revolving tumbler, not more than two revolutions per minute, or paddle should be used, preferably the latter, as it allows closer supervision of the operation. After bating, washing in cold water is necessary for 10 minutes.

PICKLING.

For making up a fresh pickle for reptiles the following recipe is recommended:—

3 per cent sulphuric acid
20 per cent salt
150 per cent cold water
} on dry weight.

Drum the goods in this liquor for 30 minutes, then allow to drain and transfer to strong brine solution, 20 Twaddle, for 20 minutes. If goods are to be alum tanned, pickling should be omitted and a bran drench substituted. After draining, the goods should be weighed.

VEGETABLE TANNING.

Excellent results can be obtained by use of sumach extract followed by bleaching with a suitable synthetic tanning material. Tanning is very simple and can be best carried out in a drum using.

5 per cent sumach extract
1 per cent sodium acetate
150 per cent water
} on pickled weight.

Run goods for 6 hours and then stand for 8 hours. Add 10 per cent. sumach extract and run for 8 hours and stand for 10 hours.

Next add another 10 per cent. extract and drum until tanned. After draining for 24 hours drum in

10 per cent. synthetic tannin
150 per cent. water.

Choice of synthetic tanning material is very important. There are a number of excellent bleaches available which clear the yellowish stain of the leather and insures a very satisfactory white. The spent sumach liquor can be used for the next pack.

ALUM AND GAMBIER TANNING.

Drum in a liquor made up of

5 per cent gambier
2½ per cent salt
2½ per cent alum
200 per cent water
} percentage on pickled weight.

After six hours add a further 2½ per cent. gambier and one per cent. alum. Drum for 4 hours and then allow goods to stand for 8 hours. Continue drumming when liquor is strengthened with a further 2½ per cent. gambier and 1 per cent. alum. At the end of 3 days the skins should be tanned, but if penetration is not complete, a further 2½ per cent. gambier may be used without the addition of any alum.

This tannage produces a very light coloured leather, soft and with a good

handle. It is, however, unsuitable for reptile skins which have to be finished pure white.

ALUM TANNING.

One of the most useful methods of tanning is carried out with alum. If goods are pickled they must first be depickled with borax and tested with a suitable indicator to determine degree of neutralisation. Alum tanning is preferably carried out in a drum, but sometimes it is carried out in a barrel or vet, occasionally stirring the skins around with a wooden pole. True, this method takes considerably longer than drum tannage, but there is of course, no danger of the goods getting entangled and knotted. Quantities of alum, salt and other chemicals must be based on the limed weight of goods. A suitable recipe is as follows:—

5 per cent. aluminium sulphate
4 per cent. salt
1 per cent. sulphonated neatsfoot oil
10 per cent. flour.
3 per cent. china clay.

These various ingredients should be made up into a thin paste with cold water and goods processed in it for 4 days; drumming 3 hours a day and taking care to see that when the drum is stationary the skins are poked under the liquor. At the end of that time the goods must be taken out and horsed up to age for 12 hours. They can then be returned to the drum for feeding. The feeding or fat-liquoring is usually completed in two stages, the first of which takes place in the spent liquor replenished by the addition of the following:—

3 per cent. flour
1½ per cent. sulphonated neatsfool oil.

Drum for 8 hours, then take out goods and drain for 12 hours. Complete the feeding process by drumming in the following mixture in a clean drum.

10 per cent. china clay,
5 per cent. flour.
4 per cent. egg yolk.
½ per cent. neatsfoot oil.
(Sufficient water to make a thin paste).

Drum for 6 hours, drain for 12 hours and then hang up and dry. While still damp, goods should be thoroughly staked and dried slowly in a warm but not hot stove. Then follows fluffing or buffing on the flesh side. Brush thoroughly on the grain. Finishing is usually very simple and, indeed, some tanners merely roll or warm press before measuring. Throughout the processing every effort must be made to retain the spotless whiteness of the goods.

EXTRACTION OF FAT FROM BONES.

THE extraction of fat from bones is an indispensable operation, even when it is a question of merely converting the bones into dust for manure. In fact, bone dust not deprived of its fat is of less value, because the fat decomposes very slowly in the soil, and constitutes an obstacle to the phosphoric acid becoming soluble.

Fat may be extracted from bones by three processes; (1) By simple boiling in open pans. (2) By the action of steam in closed vessels. (3) By solvents. The extraction of fat by simply boiling leaves the ossein almost intact, but generally thereby only a portion of the fat in the bones is obtained.

By extraction of the fat by steam a higher yield of fat is obtained, especially if the operation is continued long enough, but a portion of ossein is then transferred into gelatine. Bone dust from bones treated by steam is more soluble than that of bones from which the fat has been extracted by simple boiling.

But the bone dust so obtained is less rich in nitrogen. The extraction of bones by solvents (benzene, petroleum ether, etc.) gives a larger yield in tallow whilst preserving integrally the ossein of the bones.

EXTRATION OF FAT BY SIMPLE BOILING.

This process is the most ancient and recalls the skimming of the cook's "stock' pot. In a cylindrical cast-iron pan a little wider below than above, there are introduced by means of a perforated iron basket the bones to be extracted. The bottom of this basket can open into two semi-circular parts held by hinges on a cross bar, dividing the basket into two equal parts. These two doors are closed by hooks, so as to receive the charge. The basket is cylindrical, and little smaller in diameter than the pan which contains it, by 4 inches. A strong circular hook at the top supports the sheet iron and carries four strong handles, by means of which the cross-piece of the crane ca[n] lift it. The cast-iron pan is fitted with gutter or throat; so as to separate the fa[t] from the water in a continuous manne[r]. The basket, therefore, being charged wi[th] bones in the fat extraction pan, water [is] run in to immerse the bone and steam [is] caused to bubble in the bottom from a perforated steam coil. The water, brought [to] about 100°C (212°F), causes the fat [to] rise from the bones through holes in th[e] gutter at the same time as the excess [of] water. The fat flows constantly from th[e] gutter by the horizontal exit tube, whil[e] the water in the bottom issues through [a] bent tube without taking any fat with i[t]. The exit of the fat may be facilitated b[y] a superficial push, or by a paddle drive[n] mechanically, mounted on a vertical shaf[t] fixed on the side of the pan, capable o[f] being rotated and raised at the end of th[e] operation, so as to allow the basket to b[e] freely removed from the pan. The bone[s] are extracted in this way for about a[n] hour and a half, after which they are removed from the basket to the wa[ter]. Certain factories acidulate the water b[y] an addition of sulphuric acid, say [illegible] ton, so as to free the grease fr[om] [illegible] calcareous compounds. There is obt[ained] 1 to 5 per cent of fat according [to] th[e] quality of the bones. The same wat[er] [illegible] serve for several successive oper[ations] and finally gives a boiling of gelatine concentrated enough for making glue. I[f] gelatine is not made, the boilings are collected and concentrated by evaporation to add them to the bone dust over again. Bu[t] the same water cannot be served indefinitely for fat extraction. After a certain time, it is remarked that the fat which [illegible] dissolves no longer rises to the surf[ace]. The solution takes a milky appearance, [it] is a sign that it is saturated with gelatine

and that its concentration obstructs the ascent of the globules of fat. It must then be drawn off and replaced by fresh water. Unless fresh bones are operated on, the fat obtained on extraction by water is generally of inferior quality, it gives off a bad smell and is more or less dark in colour.

EXTRACTION OF FAT BY STEAM.

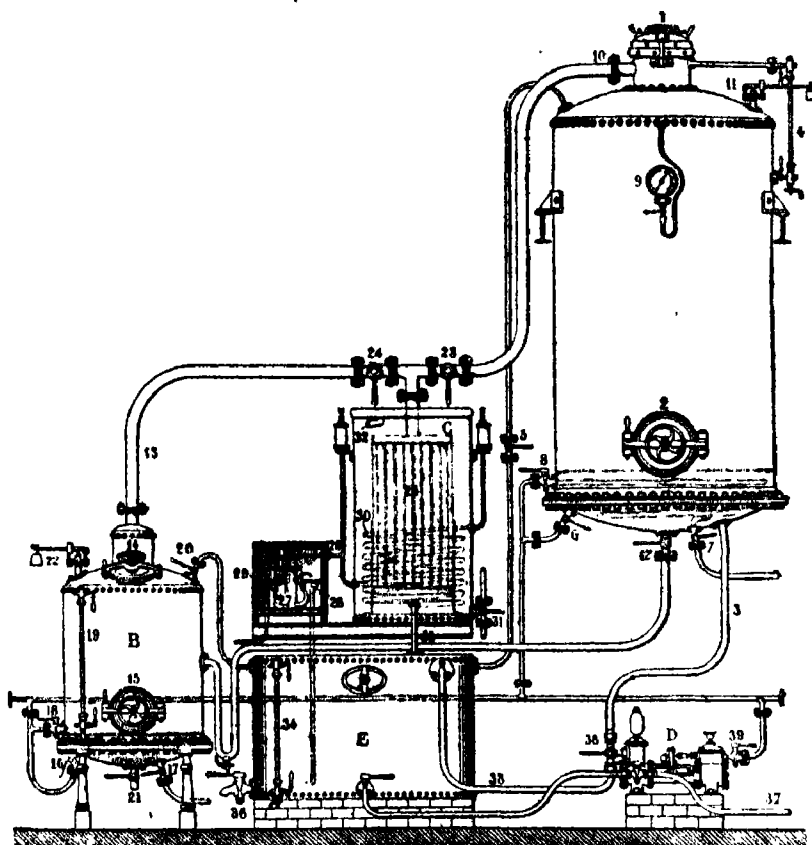
Fat extraction by steam is done in large cast-iron cylinders, capable of containing 4 to 5 tons of crushed bones, the upper opening serving for the introduction of the bones, the lower opening serving for their discharge. These openings are closed by hinged lids as in an auto-clave. Steam enters at the top and the fat runs off from the bottom by means of pipes situated near the aperture. Steam of from 2 to 4 atmospheres is used; for 1 to 2 hours. the steam entrains the fat with it. The condensed water, charged with fat and gelatine, collects in the space reserved below the false bottom and is afterwards added in the manufacture of nitrogenised superphosphates. The solution of fat and gelatine is drawn off from time to time, and the treatment of steam continued until a sample of the liquid contains no more fat To separate the two, the different draw-offs are united in a wrought-iron pan with a conical bottom, fitted with a steam jacket into which steam is injected, and a tap for drawing off the fat. The object of heating is to keep the gelatine fluid enough for the fat to separate on standing. When separation is complete, the fat runs off by the above-mentioned tap, and the gelatine is run into an evaporation pan through a valve in the conical bottom of the pan.

The fat extracted from bones by steam has perceptibly the same colour as that got by boiling, but it is of better quality and gives off a less unpleasant smell.

EXTRACTION OF FAT BY BENZINE.

For a long time efforts were made to extract fat from bones by benzine. Deiss used carbon disulphide, but as the bones, the fat of which was extracted by this solvent, gave bad quality glues, the process hardly extended. Petroleum benzine presents, in fact, less danger than carbon disulphide, and its condensation is more easy because it boils at a higher temperature. The apparatus employed for extracting fat from bones by petroleum benzine consists essentially (1) an extractor A with a perforated false bottom, and steam coil; (2) a recuperator B or distilling pan; (3) a condenser C; (4) a pump E for circulating the solvent.

METHOD OF WORKING.

The routine of the operation may be resumed thus. A certain amount of water is run into the extractor according to the capacity of the apparatus, so as to preserve the coil and the taps from the attack of fatty acids. Afterwards, the extractor is charged with crushed bones free from foreign matter. As soon as the charge amounts to a quarter of the capacity of the apparatus, the pump is started, and a beginning made by drenching the bones with benzine. During this time the autoclave is charged in such a way that the solvent constantly bathes the bones, which enables the interposed air to escape freely. When the apparatus is full, the top stopper of the extractor is closed and the top 23 on the condenser opened. The air is allowed to escape until condensed benzine appears; the tap is then turned and the pressure allowed to rise to 1½ kgs. on the monometer (9). This pressure once reached, the steam tap is closed and the apparatus allowed to rest until morning. The benzine is charged with all the fat of the bones, and the vapours are totally condensed. The next

Fat Extracting Plant.

morning the apparatus is emptied into the distilling pan, and after a rest—about 10 minutes—the water, previously run into the autoclave, which now occupies the bottom of the pan, is withdrawn. The benzine is then recovered by distillation and by passing it through the condenser C, by means of the gooseneck 13, and the tap 24; it goes to the reservoir E. The benzine impregnating the bones is subjected to a current of steam, which finishes by entraining it into the distilling apparatus. When it has been made certain that nothing but water passes in the distillate, the extractor is emptied, first opening the lid of the top manhole, and then the bottom one. The distillation is continued until no more petroleum benzine distils. At this moment a current of steam is injected into the fat by means of a perforated steam coil which carries off the last traces of solvent. The fat can then be drawn off from the distilling pan by the tap 21.

PURIFICATION.

Fresh bone fat is naturally whiter than the fat from the ordinary country bones. It is purified by treatment in a lead-lined pan, by water acidulated with sulphuric acid, of which an excess must not be used. The fat and the acidulated water are then heated by a perforated steam coil, which beats the two up together. After some time the tallow shows clear and no turbidity in the spoon. The steam is turned off and the whole allowed to stand. The mixture of tallow, gelatine, carbon and phosphate of lime, and fatty acids com

bined with lime is destroyed, the gelatine is dissolved and oxidised by the acids, and the lime is precipitated as sulphate of lime with various impurities. After sufficient resting, the layer of fat is separated by means of a pipe hinged to the draw-off tap. This pipe enables the pure fatty layer to be run off and to reject the water and sulphate of lime. The purified grease falls into a wooden vat lined with lead, where it is washed several times with boiling or simply tepid water. After which it is let stand and drawn off as before into casks for use in soap works or candle works.

BLEACHING.

To the melted fat mixed with half its volume of water, 2.5 per cent of chloride of potash is added and enough hydrochloric acid to decompose the whole of the chlorate. An excess of this acid is added to neutralise calcareous compounds. The tallow is purified and whitened with 2.5 per cent chlorate of potash and a semitint obtained; with 5 per cent of chlorate a whiteness of the tallow is obtained analogous to that of lard. It is washed several times with water, until the wash water, until the wash water is free from chlorine, which is recognised by iodised paper. Bleaching by sunlight is equally energetic. The fat must be run into shallow vats which are exposed to the light. Agitation in presence of ozonized air also constitutes a method of bleaching. At the normal temperature, bone tallow is soft, unctuous, and does not rancidify easily. Although insoluble in water like all fats it contains about 2 per cent of water, which it is impossible to eliminate even by heating it to 100°C. To obtain it in an anhydrous state; it is necessary after having refined it to heat it upto 150°C. and to maintain it for some time at that temperature. But it easily finds a buyer even when it contains a little water.

MANUFACTURE OF RUBBER BANDS AND RINGS.

THESE small articles occupy an important place among the rubber articles of commerce. The manufacture of them is not at all difficult, but it is essential that the goods should not become brittle when they remain unused for a considerable time.

Most rubber bands, in their various sizes have to stand considerable stretching, and this must be borne in mind from the very beginning of the manufacture. In no case should the mixing be overworked, but should be run into sheet as rapidly as possible. Suitable compositions are as follows:—

I.

Para rubber	100	parts.
Golden sulphide of antimony	25	,,
Vermilion	5	,,

II.

Para rubber	100	parts.
Golden sulphide of antimony	30	,,
Barytes	40	,,

It is not advisable to run the sheet round and round the calender toil until it is smooth, but it should be run on the three roll calenders, and doubled and finally rolled up tightly on the roller and allowed a whole day to cool down. This method has the advantage of giving a much tougher sheet, and any small air-blisters that may have been present will have been got rid of by bursting. When the sheet has been unrolled the separate pieces are gently warmed and pressed between zinc plates. The polished sheets are put through a cutting machine which cuts them into bands of a definite width, lays the ends together to form a tube, and at the same time presses the scams together. In order to make the scam quite secure this

tube now passes under two mallets, working behind the other, which hammer the seam.

The tubes are vulcanised on glass mandrels, on which they fit tightly and the heat is applied by means of a water-bath preferably to laying the goods in chalk, the temperature being raised rapidly and the cure completed at a pretty high temperature say 60°C within 15 minutes. The coupon bands and rings are cut from the tubes on automatic lathes.

Rings are made up like the tubing on mandrels. It is best to use thin sheet for this purpose; the tube is wrapped and vulcanised as such, and from it the rings 0.3 mm. in width are afterwards cut on an automatic lathe.

If tinned steel tubing be used for the mandrels, a smooth glossy appearance is imparted to the inside of the ring, and no French chalk need be used on the mandrel. The rubber used for these rings contains a very low percentage of sulphur, and the rings have therefore little tendency to bloom; it is therefore hardly necessary to boil them up after curing; they are however cleaned with soap and water, and then, in order to give them a polish, rubbed over with a very weak solution of glycerine to which a few drops of oil of rose have been added in order to mask the smell of the rubber.

If the rings become tender, this is probably due to excessive working of the rubber on the mixing and calender-rolls.

In making Rubber Bands and Rings direct from latex it is advisable to take the equipments for making balloons and proceed in the usual way of dispersing the ingredients in the latex composition.

A suitable formula for this is as follows:—

Rubber latex 60 per cent.	167	parts.
Zinc oxide	2	,,
Sulphur	1.5	parts
Zinc diethyldittheo carbonate	1	,,
Mercaptobenzthiazole	0.2	,,
Liquid paraffin	5	,,
Casein solution (10 per cent.)	15	,,
Aniline colour to tint	1	part

To prepare 10 per cent casein solution take 100 grams of lactic casein and make into a paste with a little water. To this add 15 grams of ammonia sp. gravity 0.880 in 900 c.c. of water and 4 grams of Beta Naphthol as preservative.

COAGULANT.

Calcium chloride	5	parts
Methylated spirit	47½	
Water	47½	

MIXING AND DISPERSING.

In mixing and dispersing take the rubber latex in a enamelled vessel.

Now take the solid ingredients in another enamelled vessel and moisten the mixture with a little water and then make a paste with the casein solution.

This is next gradually mixed with the rubber latex and stir vigorously with a whisker or with a mechanical stirrer for about 15 to 20 minutes. After mixing add the liquid paraffin or kerosene oil and the aniline colour dissolved in a little spirit. Again stir for a few minutes.

Having prepared a satisfactory latex mixture it is necessary to deposit this on formers made of hollow glass tube or aluminium tube of suitable diameter. To do this the latex mixture is passed through a strainer into the dipping tank, which is also made of enamelled iron. The vessel is filled some time before it is required for use and any air bubbles which may have been formed inadvertently are removed by slowly skimming the surface prior to use of the bath,

DIPPING.

In the dipping operation the formers are first dipped into the coagulant and then after taking out do are immersed into the latex mixture. Slowly take out the formers and allow to dry. Again dip them into the coagulant and then into the latex and thus the process is repeated until the desired thickness say .2 to .5 mm. thick.

Now the dried latex still on the mandril or formers is cut with a sharp knife to form rings of desired width. And then hung up hot air chamber for 15 minutes. The temperature inside the chamber is about 100°C that is the temperature of boiling water.

After vulcanising take out the rings from the formers and wash with boiling water. Then dry and rub up with French chalks and pack.

COLOURING ALUMINIUM ARTICLES.

WHILE the value of aluminium for the majority of its applications resides in its special physical properties, it is indisputable that an attractive appearance will materially add to the selling value of an article. Thus the value of aluminium articles lies in its excellent fascination of the mirror-like polish as well as in its multiple of colours and enamels that can be applied over its surface by chemical means. The polishing of aluminium is usually done by the common methods of buffing with some abrasive materials but the colouring which imparts the most attractive appearance, is not at all easy. It is the purpose of this article to hold before the readers the detailed process of colouring this article.

The operation may be carried out in two stages. In the first place the aluminium articles should be subjected to anodic oxidisation by means of electric treatment and then the articles are coloured in a dye bath.

ANODIC OXIDISATION.

It is well known that aluminium articles on exposed to the atmosphere are slowly oxidised. Normally this oxide is invisible on the surface of the metal owing to its extreme thinness. But means are available whereby it can be thickened up until it appears as a white matt coating. The process adopted for thickening up the oxide coating must be such that a uniform film is produced. and that the film is strongly adherent. and one of the most convenient methods is to make the aluminium article the anode of an electrolytic bath. Almost any electrolyte (e.g. sulphuric acid or sodium bicarbonate solution) is capable of producing an oxide deposit on the aluminium under these conditions. The arrangement is the same as for ordinary electric plating. except that aluminium acts as the anode. while the cathode may be of iron or carbon. The main difference lies in the fact that the electrical resistance of the bath automatically increases as the oxide film forms , so that the current gradually dies off. and for this reason it is necessary to commence with a comparatively low voltage across the bath. increasing it gradually as the current falls. A maximum voltage of about 50 volts will be necessary, and means must be provided for reducing this down to a very few volts for starting. The most convenient and economical method is to use a shunt-wound dynamo with a field rheostat.

The nature of the oxide film varies according to the electrolyte employed, and while with certain solution the oxide is deposited in a somewhat spongy condition, with others the deposit is like a glass, strongly adherent. impermeable coat. Of all the possible electrolytes it appears that

the most satisfactory is a solution of 3 per cent of chromic acid. With this solution it is found that the oxided film has a remarkably protective effect against corrosion, and is at the same time so firmly adherent that it can only be removed by such drastic methods as filing. Aluminium objects treated by this process has been exposed to the sea for months in such a position that they are periodically wetted and dried under the action of the tides, without showing any trace of corrosion, and good results were obtained even when the aluminium article was clamped to some other metal. This, apart from the purely decorative effect of the oxide film, this process has a special value where the article is to be exposed to adverse conditions.

It may here be remarked that the decorative effect depends to some extent upon the nature of the metal under treatment. With pure aluminium the deposit is matt white, but with alloys the coating takes on a greyish appearance more or less dark according to the composition. With silicon alloys the process gives a very striking gun-barrel finish.

The chromic acid should be pure, and free from sulphates and sulphides, and if the best results are to be obtained the temperature of the bath should not be allowed to rise above 40°C. A description of the process is as follows:—

After a preliminary washing in petrol to remove all grease, the metal is immersed in the bath and the voltage is gradually raised from zero to 40 volts in 15 minutes. It is then held at 40 volts for 15 minutes, raised to 50 volts gradually in 5 minutes, and held at 50 volts for 5 minutes. The object is then washed in water and dried. A current density of about 3 amperes per sq. ft. is required for pure aluminium, though this varies with the nature of the surface and the purity of the metal. If the aluminium has a local spot where some other metal is embedded in it, or is in contact with any other metal during the treatment, a very high current will be taken and the treatment become impossible.

The film appears to have a microscopic cellular structure which can absorb a certain amount of grease, and when the film is reinforced in this manner the protective effect is still further increased. A suitable impregnating substance is lanoline applied as a 10 per cent solution in benzine.

ACTUAL COLOURING.

It is a known fact that aluminium oxide is used as a mordant in certain classes of textile dyeing, its function being to absorb and fix the dye within the fibres of the material. It will be understood, therefore, that if an article of aluminium freshly coated with aluminium oxide by the electrolytic process, be dipped into a suitable dye the oxide film will be strongly and permanently coloured. This process is capable of giving some very beautiful effects. Among the dyes which may be used are Alizarine orange, Alizarine diphenyl B. Anthraquinone blue, Alizarine yellow L. Anthracave blue, Solway blue SE Alizarine edestol B, Solway blue-black B Alizarine red S, Solway green E, etc.

All these produce brilliant colourings which are not removable without removing the oxide film, and thus, as has been stated is only possible by machining, or by some other method which removes the underlying metal as well. Dyed sheets of aluminium can be bent to a considerable angle without cracking, and are as well fitted to withstand the wear and tear of ordinary use as the best enamel coatings.

DECORATING ALUMINIUM ARTICLES.

A process for decorating aluminium, patented in Germany, prescribes that the

objects be first corroded, which is usually done with caustic soda lye, or, better still, by a new method which consists in heating 3 parts of sulphuric acid with 1 part of water to 140° to 158°F., in an enamelled vessel. Into this liquid dip the aluminium articles, rinsing them off clean and then drying them well. The corroded articles are now placed in a bath consisting of 1,000 parts of alcohol (90 per cent), 150 parts of antimony, 250 parts of chemically pure hydrochloric acid, 100 parts of manganous nitrate, and 20 parts of purified and finally elutriated graphite. In this bath, which is heated to 86°—95°F., the objects are left until fumes develop around them, which takes place in a few seconds. Now they are put over a coal fire or similar arrangement until the alcohol is burned up and there is no more smoke. After they are somewhat cooled off, they are laid into cold water and worked with a brush, then rinsed with water and well dried. The pieces are now provided with a gray metallic coating, consisting mainly of antimony, manganese, and graphite. This metallic layer renders them capable of receiving a lacquer which is best prepared from 1,000 parts of alcohol (90 per cent), 50 parts of sandarac, 100 parts of shellac, and 100 parts of nigrosine (black aniline colour). Then the articles are quickly but thoroughly rinsed off, dried in warmed air for a few minutes and baked in ovens or over a moderate coal fire until they do not smoke any more and no more gloss can be seen. Finally they are rubbed with a cotton rag saturated with thin linseed-oil varnish, and the objects thus treated now appear dull black, like velvet. The covering withstands all action of the weather, so that cooking vessels coated with this varnish on the outside can be placed on the fire without injury to the coating. If the articles are engraved, the aluminium appears almost glossy white under the black layer at the engraved places. When the pieces have been provided with the gray metallic coating, coloured lacquer may also be applied with the brush. In this manner paintings, etc., may be done on aluminium, which is not possible on unprepared aluminium surfaces, which will not retain them.

FISH PRODUCTS.

THE industrial value and importance of fishes is by no means limited to their use as food. They yield large quantities of valuable oil. The fish waste, or offal, chiefly heads, skins, bones and viscera that is discarded by the fish curer may be worked up to yield fish glue, fertilizers and cattle food. The skins of certain large fishes, for example the shark, are tanned and manufactured into a valuable leather.

A brief description of the methods by which fish products are manufactured will give some idea about these industries.

FISH OILS.

The various kinds of oils that are obtained from different species of fish and other marine animals, such as whales and seals, may be divided into three classes, according to the part of the fish from which they are extracted.

(1) Fish oils proper are disseminated throughout the flesh of the fish in the form of fine globules. They are extracted from the entire fish, e.g., barring, sardine, sprat, monhaden.

(2) Liver oils are located in the fish.

(3) Blubber oils constitute a thick layer of adipose tissue just under the skin of the marine mannalia, e.g., whale, seal, dolphin, porpoise.

In oily fish, such as herrings and sprats, each minute globule of oil is enclosed within a thin skin. It is practically impossible to rupture this skin and liberate

the oil simply by the application of pressure. When, however, these globules are heated the skin shrivels, the oil globules expand and burst the skin, and the liquid oil is liberated and can then be extracted from the flesh by pressure. To obtain the oil, therefore, the fish are boiled or steam heated in large vats until the oil set free. The hot mass is then placed in a press and the oil squeezed out. The residue is made into cattle food and fertiliser.

In obtaining the best sorts of liver oils, e.g., codliver oil, the livers are taken from the fish as soon as they are caught, and are heated in steam-jacketed vessels until the all membranes burst and the oil exudes. The oil is then separated by pressure.

Inferior qualities of oil are obtained by treating putrid livers in the same way. These tainted liver oils are unfit for medicinal purposes, but are used in large quantities in the leather industry.

Blubber is stripped from the whole as soon after capture as possible. Generally the dead whale is made fast alongside the whaler, a deep, spiral cut is made round its body, and the blubber is stripped off and hauled abroad. This is then cut into pieces, chopped up in mincing machines and fed into melting pans and heated with steam, often under pressure. The oil gradually exudes and collects upon the water, the cell membranes, etc.,—the greaves—settling to the bottom. At the conclusion of the boil, the oil is drawn off from above the aqueous (gluey) layer, and is clarified by straining through sieves or filters. The "greaves" is placed in hair or woollen bags and submitted to hydraulic pressure, by which means a further quantity of oil is obtained.

Fish oils, unless specially purified for medicinal purposes, are dark-coloured liquids, with a characteristic, unpleasant, fishy smell, due to the presence of small quantities of fishy decomposition products, for example trimethylamine.

When cooled, many samples of fish oil deposit solid masses of fish tallow (fish stearine).

Fish oils, and, to a less extent, the marine animal oils, e.g., whale, seal, porpoise, are drying oils like linseed oil, that is they possess to a very marked degree a capacity for absorbing oxygen from the air, and so become thickened and viscous. This thickening is generally induced by blowing air through the warm oil. Oils that have been thickened in this way are known as "blown" oils.

Blown fish oils are mixed with mineral oils for use as lubricants for heavy machinery. They have been used as vehicles for paints in place of linseed oil, but with somewhat disappointing results. They are also used in the manufacture of printers ink, and making paints for painting smoke stacks.

More particularly, they are used in the leather industry. Fish oils used chiefly in the manufacture of chamois leather. Ordinary chamois or wash-leather is made from the flesh-splits of sheep skins. The skin is well washed and softened, and freed from hair by treatment with lime. It is then split, and the loose and fatty middle layer removed by a sharp knife. The lime is removed by a short brandreth and the superfluous moisture is pressed out. The skin is thus rendered porous and easily able to absorb the oil. It is stretched on a table and oiled with fish or whale oil. The oiled skin is folded up and worked for two or three hours in the faller stocks and then shaken out and hung up for a short time to cool and partially dry. The process is repeated a number of times until all the water originally present in the skin has been replaced by oil. The oiled skins are then piled in a warm place. The

oil gradually oxidises and the skins become yellow and very hot. From time to time the skins are strewn on the floor to cool and then re-piled, the process being repeated until the oxidation of the oil is completed.

The skins are then dipped in water and passed through hydraulic presses, by which the surplus oil is removed. This surplus thick, oxidised oil is known as "degras" and is used for stuffing leathers that have already been tanned.

Fish oils are also employed in the manufacture of such closely-related, although happily diverse, substances as soap and margarine. The hydrogenation process has made it possible for their large scale utilization—the hardened whale oil melts at 40° to 50°C and is a white solid entirely devoid of taste or smell.

FISH GLUE.

Fish glue is the most important liquid glue on the market. The bulk of the fish glue manufactured to-day is made from the waste that are discarded by the curers. This waste consists of heads, bones, viscera and skins. The best glue is obtained from the skins of non-oily, demersal fish.

The waste is washed in running water to free it from salt. Sometimes the waste —particularly the heads—is decomposed with hydrochloric acid and afterwards neutralised with lime. It is then charged into a cooker provided with a perforated false bottom. The stock is covered with water and heated with steam. The glue is extracted which gradually concentrates in the water. When this glue liquor is sufficiently concentrated, it is run off (first run) and more water is added to the waste and cooking continued. After about 10 hours' cooking, nearly all the glue has been extracted and the liquor is again run off (second run). The cooked waste is then withdrawn, and any remaining glue liquor is pressed out of it and added to the second run. 2 to 4 per cent. of phenol or boric acid are added to prevent decomposition by bacteria.

The glue liquor is evaporated down to a concentration of 32 per cent. in open vats or closed evaporators, and is bleached with sulphurous acid. A small amount of some essential oil, e.g., cassia, clove, wintergreen, is added to check mould growth and mask the fishy odour. Glue is also made in a similar way from the "greaves" obtained from whale blubber.

Fish glue is manufactured in three grades. Grade I is made from skins, only the first run being used. It is used for photo-engraving work, for the production of half-tone plates.

Grade II is made from second run skin liquors and fish waste. It is sold for general repair work.

Grade III is prepared from fish heads, and is sold for sizing, box making, cabinet making, and general joiner work.

FISH GELATINE.

Fish gelatine or isinglass is obtained from the swimming bladder of the sturgeon and also of the cod. The bladders are either opened or washed, split open and dried.

Isinglass is the purified and dried inner skin of the bladder. It has but feeble adhesive power. It is used for clarifying wines, ciders, and beers, and for making jellies and plasters.

FERTILISERS.

Fish manure or fish guano is generally prepared by drying and grinding the fish waste discarded by the curer. An average sample of this kind of manure will contain 12 per cent. water, 60 per cent. organic matter, yielding 10 per cent. of calcium phosphate and a residue of salt, sand, magnesia, and potash. Fish guano is mainly valuable as a source of ammonia.

There is always a little residual oil in fish manure that tends to delay its decomposition in the soil. It is, important, therefore, that the oil removed as completely as possible.

Dry fish manure requires careful storing, as the presence of small amount of oil tends to promote spontaneous combustion.

FISH LEATHER.

The hides of such marine mammels as seals, etc., have long formed the basis of a regular tanning industry in Europe.

Of recent years, however, particularly in America, successful attempts have been made to tan the skins of certain fish, notably the shark. The skins are treated with alkali to remove fat and oil, the alkali is then neutralised with acid, after which the skins are washed and tanned. The leather is said to be soft and pliable, and well adapted for many uses.

Shark skins are also tanned hard, and used to print a grain on imitation pigskin.

Shark skin is naturally very tough and durable, and in its untanned condition is used by jewellers as a natural emery paper for grinding and polishing metal surfaces. It is also used as an abrasive in working hard woods and ivory.

A method has been devised by which a shark skin can be split into three. The first split, after tanning, is strong and thick, and suitable for high grade, heavy shoes. The second furnishes leather suitable for second grade foot wear, and the third resembles suede and used in making fancy articles. In addition to the shark's skin, the fins, blood, teeth, flesh, and oil of the fish are also utilised commercially and yield a satisfactory profit.

THE PLANTATION OF FRUIT TREES.

WHERE fruit is grown for sale, or where large quantities are wanted for home consumption, it becomes necessary to plant trees and bushes on a larger scale than is usual in the garden. A few hints on the laying out of a plantation are discussed in this article for the benefit of readers as well as fruit growers.

ASPECT.

There is little need to say much about aspect, for in most cases there is no choice in the matter. Usually the best has to be made of any land that may be available and that it may generally be done successfully is shown by the fact that flourishing plantations may be found in many situations, on hills and on the level. However, there is no doubt that the ideal is a gentle slope towards the south or south-east, whilst south-west is permissible, but no one would choose a slope towards a northerly or westerly quarter, if it could be avoided.

Shelter is a very Important factor on fruit culture, but it can be overcome A sheltered position surrounded by higher land is generally found to be more liable to severe frost being that, the cold air, being heavier than warm air, skins into the lower position and remains there stagnant. It is by no means uncommon to find fruit bloom cut off by frost in the hollows whilst that on rising ground remains uninjured. On a gentle slope there is a certain amount of air movement or drainage, which is beneficial.

A good deal can be done to protect the trees on exposed land by planting shelter trees on the outskirts of the plantation, on the side from which the high winds are to be expected; but such trees really need to be planted several years in advance of the fruit trees, to be large enough to protect the latter during the

early stages of growth. Poplars are the most rapid growers that can be planted. but, if an evergreen is preferred there is little to beat cupressus macrocarpa, which grows fast and makes a good shelter, whilst it also stands clipping if necessary. Pines are often recommended as shelter and are, no doubt, excellent in places where they grow quickly where only slight shelter is wanted, a double row of Dar sour planted on the outside of the plantation itself is often enough. Forest trees should be separated from the fruit trees by the width of a head land or road, as their roots rob fruit trees if put too close.

SOIL.

About soil it is only necessary to say that, whilst a deep alluvial soil is naturally best, it is merely essential to avoid such extremes as stiff clays, dry sands, and gravels, and very shallow land. Practically any land that will grow ordinary farm crops well can be made to grow fruit.

PREPARATION FOR PLANTING.

The preparation of the soil for planting in gardens and small orchards is more or less familiar to us but different methods are called for when we come to deal with areas too large to dig by hand. Drainage must, of course, be seen where necessary, and some steps taken to break up the subsoil. Planting after ordinary shallow ploughing is a mistake. The best preparation is to allow a subsoil plough to follow the ordinary plough down each furrow; or the land may be broken up with 2 stream cultivator going twice over the field, and penetrating as near 2 feet deep as possible. If the land is full, or has been undergrass, it is best to take a crop of potatoes before planting fruit trees, as these are a good cleaning crop, and ensure the thorough working of the soil, besides which they are generall manured.

To mark the positions to be occupie by the trees, the best plan is to let a goo ploughman draw shallow furrows acros the land in both directions, the distanc between them being that required betwee the trees. A light double breasted ploug such as is used for ridging, does the wor well. Wherever the lines intersect a hol is dug for a tree, and further precaution are taken to keep the rows straight by sighting along them whilst actually plan ing, or when driving in the stakes if stand ard or half-standard trees are used—fo these must be put in before planting. Th sites for any bushes that are to go betwee the trees can be measured out afterward by hand, using a garden line. It is ver desirable to have the rows of both tree and bushes quite straight, so that cultivation can be done in two direction whilst the trees are young.

DISTANCES APART FOR TREES.

Some varieties of any kind of fruit ar of much more spreading habit than others so that, to make the most of all the available space, distances apart should reall vary for different varieties. But this cannot be done where cultivation by bulloc or horn is to be employed, so we must b content to give all the same space.

Of apples, pears, plums, mangoes jack fruits, full standards should be 25 ft to 30 ft. apart each way; half-standards 15 to 25 ft.; and bushes (dwarf trees) 10 ft. to 12 ft. Usually the larger distances are to be preferred, but the smalle ones are enough on very poor land, where the trees naturally do not spread so much Some growers fill the space economically by alternating weak and strong-growing varieties; but we do not favour this, as it makes for confusion when gathering is in progress, besides which some kinds are

more prone to certain pests and diseases than others, so that it is most convenient for all purposes where the varieties separate in blocks. These blocks should not, however, be too large, as it has been found that some kinds are self sterile and need the pollen and other varieties to fertilise their bloom and enable it to set.

Bush fruits are usually grown between the tall trees, generally with the intention of grubbing them up when the trees grow so big as to overshadow them. They must, therefore, be placed at distances apart which are multiples of those of the trees. For instance, if the trees are 24 ft., apart, there may be three bushes 6 ft. apart between every two trees in the rows and a row of bushes 6 ft., apart midway between every two rows of trees. If the trees are at 20 ft. distances, the bushes must be 5 ft. apart, and so on.

As a rule, half-standard trees are best for market work, unless it be in the case of plums, which are free growing enough even on dwarfing stocks. Bush apples, excellent they are for gardens or small orchards where the land can be generously enriched with manure, are not always free-growing enough for field planting, unless the soil is naturally rich. On poor land there is some danger of their becoming permanently stunted through too prolific fruiting in their early years. But they are very useful for planting between full standards, to fruit in the years that must elapse before the latter begin to be profitable, and to come out when the standards want all the room.

EXAMPLES OF PLANTATIONS.

The arrangement of trees in a plantation can be varied in many ways to suit the special requirements of the grower, and we can only give a few examples as a guide. The most common plan is that on planting half-standard trees, say 2 ft. apart, with bushes 5 ft. apart between them. There would be three bushes between each two trees in the rows, and a row of bushes only midway between every two rows of trees. The bushes give a quick return before the trees come into bearing, and are about worn out by the time the trees want all the room.

On richer land bush-trained trees on a dwarfing stock could be planted instead of the half standard, 12 ft. apart each way, with bushes 6 ft. apart between them.

A cherry orchard may be started with standard cherries 30 ft. apart each way, and bush plums or apples 10 ft. apart between them to stand until the cherries occupy all the room. Apples are better for this purpose than plums, because they bear earlier. Bush fruits also could be introduced into such an orchard.

The above examples will suffice to show the ideas to be brought into play in arranging a plantation. The plans easily be varied to include any kinds of fruit the grower wishes to plant.

EUCALYPTUS OIL.

Eucalyptus oil is generally made in a vessel with copper plates at the bottom and iron sheets at the sides. A foot above the bottom of the still is a peroforated iron plate over which the dried leaves are placed so that they will not come in direct contact with the heat. But before the heating commences the still is filled with water and the required quantity of leaves are placed over the perforated plate. The cover of the still is tightly closed and the vapour is allowed to escape through a pipe into a tub, after first passing through a column of cold water. The condensed vapour contains a large percentage of water. The oil being lighter, rises to the surface and the water is allowed to pass through a tap at the bottom of the receptacle. The crude oil thus collected is refined by filtering.

Essential oils from other leaves and stems may be obtained in the above manner.

Pharmaceutical Recipes

CONCENTRATED DILL WATER.

Oil of dill	20	c.c.
Alcohol (90 p.c.)	600	c.c.
Distilled water, sufficient to produce	1000	c.c.

Dissolve the oil of dill in the alcohol and add sufficient distilled water in successive small quantities to produce 1000 c.c., shaking vigorously after each addition. Add 50 grams. of powdered talc. and shake; set aside for a few hours, occasionally shaking; filter.

Dose : 5 to 15 minims.

TANNIC ACID SOLUTION FOR BURNS.

Potassium chloride	0.42	grams.
Calcium chloride (anhydrous)	0.84	"
Salicylic acid	1.00	"
Sodium chloride	10.50	"
Tannic acid	100.00	"
Distilled water to make	1000	c.c.

Mix. This preparation will keep for 1 year at room temperature.

FOOT POWDER.

Boric acid	4	oz.
Hexamethylenetetramine	4	"
Talc powder	4	"
Zinc lactate	2	"
Zinc oxide	2	"

All materials should be ground to a fine powder, then mixed thoroughly, and placed in a shaker with a perforated top for dispensing. Powder the inside of the shoes as needed.

EMPLASTRUM BELLADONNAE.

Liquid extract of belladonna	5	fl. oz.
Rosin Plaster	13½	oz.

Melt the rosin plaster and incorporate the liquid extract of belladonna.

To prepare the rosin plaster proceed as follows :—

Rosin	100	grams.
Plaster of lead	850	"
Hard soap	50	"

Melt together the rosin and the plaster of lead at as low a temperature as possible, and incorporate the hard soap.

PLASTER OF LEAD.

Lead monoxide	400	grams.
Olive oil	800	"
Distilled water	q.s.	

Boil the lead monoxide and the olive oil with 400 c.c. of distilled water in a steam bath, replacing from time to time water lost by evaporation; stir constantly, until combination is effected. Remove the mass, when cool. Knead it thoroughly with hot water; remove excess of water by suitable manipulation.

EFFERVESCENT BISMUTH CITRATE AND PEPSIN.

Bismuth Ammonio-citrate	1½	oz.
Pepsin	½	"
Sodium bicarbonate	8½	"
Tartaric acid	4	"
Citric acid	3	"

Mix the powders intimately; place on a tin lined or enamelled tray; heated to about 100°C and when the particles commence to aggregate, move them about turning the whole over occasionally by means of a broad spatula, until a granular lumpy mass is formed. Remove from the source of heat, break up the large pieces, and pass through a sieve of suitable mesh. Afterwards dry the granules and pressure in well-sealed bottles.

SYRUP OF TOLU (B.P.).

Balsam of tolu	25	grams.
Sucrose	660	"
Distilled water, sufficient to produce	1000	c.c.

Add 400 c.c. of boiling distilled water to the balsam of tolu, contained in a tared vessel; cover it lightly and boil the contents gently for half an hour, stirring frequently. Add distilled water if necessary, so that the contents of the vessels weigh 360 grams. Cool, filter the solution, add the sucrose, dissolve by the aid of a water-bath and finally add sufficient distilled water to produce the required weight.

CHEST RUBBING OINTMENT.

Gum camphor	5	oz.
Menthol	3	"
Methyl salicylate	6	"
Eucalyptus oil	10	"
Cajuput oil	10	"
Turpentine oil	3	"
Petrolatum, white or yellow	16	lbs.
Paraffin	1½	lbs.

Melt the paraffin and petrolatum over slow fire or over water-bath. Then remove from the source of heat and incorporate the other ingredients one by one. When the whole mixture is about to congeal pour in wide-mouthed phials of usual size. Lastly close the lid tightly.

—PHARMACY INTERNATIONAL

AGNIMUKHA CHURNA.

Asafoetida	1	part.
Acorus calamaus	2	parts.
Long-pepper	3	"
Ginger	4	"
Ajowan	5	"
Chebulic myrobalan	6	"
Plumbago root (Chitramula)	7	"

Reduce the ingredients into powder form and pass through a cloth.

Dose: 20 to 40 grains with whey.

Recipes for Small Manufacturers

DOG SOAP.

Linseed oil	18	parts.
Caustic potash	4	"
Water	6½	"
Rectified spirit	q. s.	
Cresol	1½	part.

Dissolve the caustic potash in water. Next warm the linseed oil on a water-bath and slowly stir in the caustic potash solution. When the saponification is complete, add water if required. Then add a small quantity of spirit and cover the mass with a cup. Continue heating until the soap becomes transparent. Finally mix the cresol and set aside to cool.

CURRY POWDER.

Coriander seed	48	parts.
Ginger	8	"
Turmeric	24	"
Cinnamon	16	"
Cumin seed	8	"
Fenugreek seed	4	"
Cayenne pepper	3	"
Pimento	2	"
Black pepper	1	part.
Long pepper	1	"
Cloves	1	"
Nutmeg	1	"

Reduce the ingredients into fine powder and mix thoroughly.

DEPILATORY PASTE.

Gum Tragacanth	20	gr.
Water	1	oz.

Soak the gum in the water until it forms a homogenous jelly, then liquefy.

Sodium sulphide	40	gr.
Glycerine	1	dr.

and incorporate with above jelly.

It should be kept free from the action of the air by packing in collapsible tubes.

A little terpeneol may be added as a perfume.

JAPAN BLACK.

Japan black is prepared by putting into the set pot 48 lbs. of asphaltum : as soon as it is melted, pour in 10 gallons of raw linseed oil. Keep a moderate fire, and fuse 8 lbs. of dark gum elemi in the gun pot; mix it with 2 gallons of oil, and pour it into the set pot. Afterwards fuse 10 lbs. of dark amber in the iron pot, when it appears completely fused, pour in 2 gallons of hot oil, and pour it into the set pot; continue the boiling for 3 hours longer, and during that time introduce the same quantity of driers.

Draw out the fire, and let it remain until morning; then boil it until it rolls hard; leave it to cool, and afterwards mix with turpentine.

This Japan black when applied on work, dries up quickly into hard glossy mass.

ARTIFICIAL ROSE WATER.

To make rose water from rose oil first prepare essence of rose in the manner as given below:—

Rose oil	2.5	grams
Clove oil	100	c.c.

Now take 100 c.c. of this essence mix with 1000 c.c. of boiling distilled water and allow to stand until it has undergone the viscous fermentation and blend producing a stuff superior to most of the commercial rose water.

ARTIFICIAL MUSK.

A remarkable oily liquid, having a brown colour, and smelling so like musk that very few noses are able to detect the difference between the natural product and the artificial body, is obtained by a new process. 2 parts of isobutyl alcohol, 3 parts of metaxylol, and 9 parts of chlorate of zinc are heated together for 8 or 9 days at a temperature of about 440 or 450°F in a strong vessel, the pressure inside which speedily rises to nearly 30 atmospheres but gradually declines to about a quarter of that degree of tension, when the whole is allowed to cool gradually. The crude product so obtained is purified by distillation once or twice repeated an oily fluid comes over between 220° and 260°F; this when rendered slightly alkaline is the "musk" in question, and it may be diluted with alcohol for the use of the perfumer, to any desired degree of odoriferous strength

SIZE FOR POLISHING JUTE TWINES.

The following recipe is for a size suitable for polishing jute twines :

Starch 8 parts : glucose 3 parts, water 60 parts. Place starch in a large tub and add cold water gradually. Next add the glucose, stir it and boil for 20 minutes. Then make up: borax 1½ parts, and talc 2 parts, lithopone 3 parts, gelatine 3 parts, and water 50 parts.

Heat the mixture in order to dissolve the mixtures well stirring all the while, and boil the borax and gelatine. Then combine the two. Add salicylic acid 1 per cent., if it is to be kept. Lithopone is a mixture of sulphide of zinc and barium sulphate. The following recipes are for sizes suitable for finishing or polishing plated cords, etc.—45 gallons of water; 10 lbs. American gum; 1 lb. castile soap; 1 oz borax, 8 lbs. dextrine; 30 lbs. corn starch. Fill up the boiler with 45 gallons of water, and bring to a boil after the borax. Mix the starch in two pails with cold water, then add to the boiler, again bringing to the boiling point. Mix the dextrine in a small quantity of cold water, and add this also. Now boil the mixing for 10 minutes, or until thoroughly dissolved. Empty into clean pails and use when cold.

In the Field of Invention

PLASTIC TILES

Moulded wall tiles made of polystyrene, the most water-resistant of all plastics known, are the latest product developed in this field. They come in a wide range of colours and shades resembling glass and are lighter in weight than ceramic tiles. Plastic wall and floor tiles in various degrees of hardness are in process of development.

SELF-ADJUSTING BATTERY CHARGER.

No switching, no ammeter and automatic adjustment of voltage and current are features of a completely foolproof Senter Cel portable battery released by Standard Telephones & Cables Ltd., Aldwych, London W. C. 2. It will charge a 6V car battery at 5A or a 12V at 3A from the same terminals without switching, and it also adjusts itself in a similar manner to any input between 200—250V A.C. A red indicator lamp lights when the battery is connected and its intensity gradually diminishes as the charging proceeds. Radio dealers can charge up to eleven 2V cells by using a variable resistance of 30 ohms in series.

—ELECTRICAL & RADIO TRADING.

A NEW HEATING SYSTEM.

A recently discovered rubber derivative, which reverses the normal insulating qualities of rubber may revolutionize British farm-building heating systems. Known as pliotherm, this new material, developed by Goodyear, provides electrical, radiant heating with the turn of a switch

Test installations already carried out in the U. S. A. are now keeping houses, workshops, and farm-buildings at constant warm temperatures.

Pliotherm panels, cheap to instal, can be made in a wide range of colours, are easily combined with wellboard, wood and plastic wall coverings and are protected by using outer covering of ordinary rubber.

—FARM MECHANIZATION.

STAINLESS CLAD STEEL.

An important development has been announced in Scotland where the Colvilles Ltd., group has produced stainless clad steels. This development follows similar trends in the timber and metal industries, in that lamination is adopted to give qualities which are lacking in the constituent sections. The method of production involves the preparation of stainless slabs and normal boiler plate quality steel, in sandwich form of appropriate thickness. The sandwich is then heated and rolled to give a permanently bonded boiler plate steel with a thin veneer of stainless steel. The stainless veneer resists corrosion while the boiler plate section is sufficiently strong to give workability and backbone to the bonded unit.

A tentative estimate of the cost is that the new laminated stainless clad steels will be approximately 25 per cent. below the cost of all stainless types for comparable purposes.

—INDIAN & EASTERN ENGINEER.

NEW METHOD OF VITAMIN D.

A new method of synthetically producing Vitamin D^3 which was invented in 1942 in the laboratores of the Philips Company in the Netherlands is now being widely used in the U.S.A. and the Netherlands. In this method, the provitamin D, 7-dehydrocholesterol, is produced by the bromination of a sterol, namely cholesterol. This is followed by the removal of elements of hydrobromide acid, and the substitution of a double bond at the seven position of the sterol structure. The provitamin so obtained is then converted into the vitamin D^3 by irradiation with ultraviolet light.

—PHARMACY INTERNATIONAL.

PORCELAIN ENAMEL TESTS.

A new testing apparatus for measuring the adhesion of porcelain enamel to base metal by means of magnetic counting has recently been developed by the Research Foundation of the Porcelain Enamel Institute in the National Bureau of Standards, Pittsburgh. It was primarily designed to supplement the conventional fracture test for adhesion and provide more complete data on the impact characteristics of porcelain enamels. The tester unit is assembled in one piece, consisting of a test head stand and specimen holder mounted on the control, which contains the powder supply selector switch and magnetic counter. The test head is moulded plastic and contain 169 spring-actuated steel probes, individually connected to respective segments of the selector switch. The mass of probe is similar in appearance to the face of a fine wire brush.

Formulas, Processes & Answers

CITRIC ACID FROM LEMON JUICE.

545 J. P. M., Baroda—Desires to know a process of preparing citric acid from lemon juice.

Lemon juice	4 pints.
Prepared chalk	4½ oz.
Diluted sulphuric acid	27½ oz.
Distilled water	2 pints.

Heat the juice in an earthen or porcelain vessel, add the chalk, let the powder subside, and pour off the liquor. Wash the citrate of lime frequently with warm water, pour on it the sulphuric acid and water and boil for 15 minutes, express the liquor, filter it, and evaporate with a gentle heat, then set it aside to crystallise. To obtain the crystals pure, dissolve them a second and third time, filter each solution, evaporate, and set it aside to crystallise.

SILICATE OF SODA.

596 S.P., Jhang Mandi — Wants to know a method of manufacturing silicate of soda.

Sodium silicate comes into commerce in the form of a thickly fluid and tough mass, obtained by fusing together quartz and with soda. In order to prepare it mix 15 parts of fine quartzsand with 8 of sodium carbonate and 1 of wood charcoal powder and fuse the crucible, when cold, is taken out, pulverised and exposed to the air, being frequently stirred during the time. The powder is then several times washed with cold water, and then boiled with 5 parts of water until all is completely dissolved. The solution is then filtered and evaporated to a specific gravity of 1.25. In this manner a sticky, syrupy liquid is obtained which, on exposure to the air, dries to a transparent glass.

Another recipe follows :—

Mix 45 parts of quartzsand, 23 of anhydrous sodium carbonate, and 3 of wood charcoal powder. This mixture is easier to fuse.

MILK POWDER.

637 R.L.S., Bawanikhera—Wishes to have a process of making milk powder.

Milk powder from skimmed milk is generally manufactured by the film drying system or by dropping concentrated milk between two horizontal steam-heated revolving metal cylinders. This apparatus is known as a twin-cylinder drying machine. It is composed of two cylinders placed side by side and slightly separated from each other so that there is contact in the periphary. The milk fed continuously to a trough constituted by the upper parts of the cylinder and suitable end walls, is carried round as a film on the surfaces of the cylinders. There are scrapers or knives for removing the dried milk from the cylinders, and close to the bottom there are receptacles to receive the finished powder. The cylinders and heated internally by means of steam of 40 lbs. pressure. In consequence of the temperature used, this process has the additional advantage of providing a sterile product.

In dough drying system the milk is first condensed in any manner, either by heating in open pans under atmospheric pressure or in the vacuum pan. The concentrated product is subsequently ground to a fine powder.

LEMON SQUASH.

653 R.N.B., New Delhi — Wants to have good recipes of lemon squash and fruit salt.

Lemon squash is made with the expressed juice of lemons to which suitable amounts of sugar and water are added; occasionally a little lemon oil is added to flavour. The lemon juice for this purpose is obtainable racked or cloudy, the cloudiness being due to the presence of pulp which floats in the liquid.

Orange squash is also made in the same manner from expressed juice of oranges.

ARTIFICIAL LEMON SQUASH.

Sugar	2 lbs.
Citric acid	1 oz.
Distilled water	28 oz.

Dissolve and add the following previously prepared :—

Oil of lemon	½ dr.
Tinct. of lemon peel	1 oz.
Tinct. turmeric	½ dr.
Caramel	20 mins.

Shake up the tincture of lemon peel with the oil of lemon occasionally during 4 hours; allow the oil to separate, decant the tincture and mix the latter with the other ingredients and filter.

FRUIT SALT.

Bicarbonate of soda	2 oz.
Tartaric acid	2 oz.
Cream of tartar	2 oz.
Citrate of magnesia	2 oz.
Epsom salts	2 oz.
Sifted sugar	2 oz.

Dry the ingredients separately by putting them by the side of a stove or oven. Then mix well and bottle for use. Adult dose: one tablespoonful to a tumbler of water.

DRY CLEANING FLUID.

665 M.I., Aijal—Wishes to have a formula of dry cleaning fluid.

Glycerol Oleate	2 fl.oz.
Carbon tetrachloride	60 fl.oz.
Solvent Naptha	20 fl.oz.
Benzine	18 fl.oz.

Mix.

This is an excellent cleaner that will not injure the finest fabric.

SHARPENING OLD FILES.

673 G.V.N.A., Ajmer—Desires to have a method of sharpening old files.

Dull files may be sharpened without recutting by treating them with acid or with the sand blast. Of these two methods the acid treatment is generally carried out.

In sharpening files with acid they are first freed from adhering grease by scratch brushing with the use of caustic potash into an oblong box of a material not attacked by acids, a few thin glass rods or varnished sticks of wood being first placed upon the bottom. The files being laid alongside each other, sufficient cold water to cover them is poured into the box, the eighth part of concentrated nitric acid is then added, and after mixing water and acid by moving the box, the whole is allowed to stand quickly for 25 minutes. The files are then taken from the bath having previously been strengthened by an additional eighth part of nitric acid. During this operaion care must be given to several times turn the files and to see that they are entirely covered with the fluid. The files are then again taken from the bath, thoroughly cleaned with a scratch brush and replaced in the bath, to which previously the sixteenth part of concentrated sulphuric acid has been added. The bath now becomes heated, and red-brown vapours of hyponitric acid escape. Care must be taken to keep the box in a rocking motion so that the acids act as uniformly as possible. After 5 minutes the files are again taken out, cleaned, and then replaced for 5 minutes more in the same bath, previously strengthened by the addition of one-sixteenth part of more concentrated sulphuric acid; care must be taken to constantly keep the bath in an undulatory motion. The operation is now finished, the files being finally scratch-brushed and for the removal of every trace of acid, placed in a vessel with water compounded with a few handfuls of caustic lime, which gives them good colour. They are then rinsed in clea[n] water, dried over a spirit-flame and rubbed wit[h] a little oil.

The treatment with acid may also b[e] effected by means of a galvanic battery, th[e] bath, which is composed of water, 100 parts nitric acid, 80 parts; and sulphuric acid, [4] parts, being connected with the positive pol[e]. The negative pole is formed of a copper spira[l] passing round the files without touching them and with the end positive towards the surfac[e] of the fluid. By using a galvanic battery of 1 Bunsen elements 10 minutes suffice for th[e] treatment.

SHARPENING FILES WITH THE SAND BLAST.

This process consists in forcing wit[h] great rapidity a jet of fine sand against th[e] file to be sharpened by means of a jet of stream. The file is presented to the jet of sand at a[n] angle of from 40° to 50° and so moved that th[e] jet of sand gradually strikes the entire surface. The sand used for the purpose must be ver[y] fine and sharp, and prepared by washing an[d] elutriating. It is used in the shape of a fin[e] mud kept in a suitable holder.

Regarding newly cut and hardened files th[e] following process may be mentioned, whereb[y] the breaking out of the teeth is as much a[s] possible prevented. Fill an iron boiler 30 t[o] 40 inches long, 6 to 8 inches wide and of a cor[-]responding depth with well water. Heat th[e] contents of the boiler to boiling over a larg[e] weed fire which, however should strike only th[e] bottom of the boiler. Now add to the water [1] oz. of white soap, previously dissolved in warm water, and 4 oz. of potash. Then pour in colza oil until the entire surface of the contents of [the] boiler is covered. The hardened and cleaned files, secured to suitable double iron wires, are then immersed in the boiling fluid for 2 or [3] minutes, when they are taken out and laid upon a table or a board. By the heat communicated to the files the water soon evaporates, whilst the oil in a short time penetrates through the cuts. By this means the teeth become more elastic and do not break so readily.

GRAPHITE REFINING.

722 D.D., Betul—Desires to know a process of refining graphite.

The principal impurity in the graphite ore is siliceous matter. In low grade ore the percentage of impurity is as high as 70 per cent.

In order to obtain graphite of any commercial value, it is first of all necessary to eliminate a considerable part of the impurities. The difficulty of this operation lies in the fact that the graphite and the associated impurities have almost the same specific gravity.

Hence there is no established method of recovering graphite from the containing rock. Most methods of treatment, however, take advantage of the tendency of the light, greasy flakes to float on a surface of water sometimes, though more often otherwise, according to oil flotation methods similar to those employed for treatment of metallic ores. The degree of fineness to which the ore must be crushed depends upon the character of the flake. The method as now elaborated is as follows:—

Graphite ore is first of all reduced to powder in a disintegrator and passed through a 100 mesh sieve. The finer material is then well mixed with liquid fuel in the proportion of 35 lbs. of ore to 1 gallon of fuel. The mixture is then placed in a wash box consisting of an ordinary rectangular box, the bottom of which consists of a sieve of 60 mesh. Water is allowed into the box so that it just overflows and the plastic mass is well agitated. The water overflowing at the top carries off the fine impurity. Much of the water, however, escape through the bottom of the box and this carries away the heavier particles.

Washing is continued until the wash comes off fairly clear. The graphite so washed is No. 2 quality. This wash water is collected in a large wash tub. Some graphite is usually found floating about it. This is skimmed off and added No. 2 residue. The wash water is then agitated and poured away. The supernatant liquor holds practically no graphite in suspension, but in the residue found at the bottom of tub there is graphite. The residue is collected and added to No. 2 residue.

When a sufficient quantity of No. 2 residue has been collected, it is washed in a wash box. This is a very rapid operation. The wash water again carries some graphite with it in suspension but the quantity is not worth recovery and wash water from No. 2 residue is run direct to waste. The residue in the wash box is No. 2 quality graphite.

No. 1 graphite is obtained from No. 2 by further treatment. No. 1 graphite is only used for high grade pencils where cost is a minor consideration as compared with quality.

LEMON OIL.

768 M.V., Tuni—Desires to know a process of manufacturing lemon oil.

In the manufacture of lemon oil the lemons after collection are minced in hand-operated mincing appliances, and the pulp thus obtained is then distilled in a steam still after the addition of water of about one-third the volume of the pulp. The vapour generated during the distillation is condensed in a tubular tin-lined condenser and collected in an aspirator bottle where the oil separates in the form of a layer over water. The layer of water is removed through the stop cock at the bottom of the bottle. This water is added to the pulp in the subsequent charge in order to recover any oil emulsified with it. The last traces of visible water from the oil are removed by means of a separating funnel. The oil is then filled in 23 oz. glass bottles. A little anhydrous calcium chloride is added to every bottle which is then corked air-tight. The bottles are shaken upside down 5-6 times a day for two days and then the contents are allowed to settle. Calcium chloride absorbs most of the water in the oil. When the stock reaches 200 to 300 lbs. the bottles are opened and the oil poured through a strainer into a large tin-lined brass container capable of holding 300 lbs. of the oil

ACTIVATED CHARCOAL FROM COCONUT SHELL.

772 S.S.P., Ernakulam—Wishes to have a method of manufacturing activated charcoal from coconut shell.

To manufacture activated charcoal from coconut shell, heat the shells in a closed retort to 900°C at atmospheric pressure for about 12 hours. Then crush the material to pieces of about 1/10th of an inch diameter and subject them to the action of superheated steam at 950°C for some hours.

BLUE-BLACK FOUNTAIN PEN INK.

783 B.M.J., Bombay—Wants to have formulas of preparing blue-black fountain pen ink, face powder, etc.

Tannic acid	2½ oz.
Gallic acid	1 "
Ferrous sulphate	3½ "
Hydrochloric acid dilute	2½ fl. oz
Gum Arabic	2 oz.
Carbolic acid	75 grms.
Acid blue	½ oz.
Distilled water to make	100 "

Dissolve the tannic and gallic acids in 5 oz. of distilled water. Dissolve the ferrous sulphate and gum arabic in about 20 oz. cold water. Add the hydrochloric acid and immediately mix the two solutions.

Add the carbolic acid, acid blue and sufficient water to produce 100 ounces. Keep aside for fortnight; then filter and bottle.

FACE POWDER.

Rice starch	7½ lbs.
Maize starch	2½ "
Talc	1 lb.

Zinc oxide	10	oz.
Carmine	3	"
Otto of rose	3	"
Otto of khus khus	3	"
Sandal oil	3	"

Mix.

BOOT POLISH.

Shellac wax	3	lbs.
Bees wax	1	lb.
Hard paraffin	2	lbs.
Soft soap	1	lb.
Turpentine oil	2½	gallons.
Oil soluble dye	1	oz.

Melt the wax over slow fire in capacious iron pan. Next add the soap and heat to dissolve. Then slowly stir in the turpentine oil and lastly dye dissolved in a little turpentine oil; when thoroughly mixed extinguish the fire but go on stirring until the mixture begins to thicken. At this stage pour in tins.

HAIR DYE.

807 P.L.S., Bombay—Wishes to know good formulas of hair dyes of one solution types.

I.

Pyrogallol	5	grms.
Sodium Sulphide	10	"
Distilled water	200	c.c.
Ferric chloride	10	grms.
Nickel nitrate	20	"

Dissolve the sodium sulphide in the water, then add the pyrogallol and finally the metallic salts. The bottles in which these solutions are delivered should be well corked and completely filled, to prevent oxidation of the contents.

II.

Pyrogallic acid	20	grms.
Pyroligneous acid	250	"
Alcohol	650	"
Eau-de-cologne	100	"

Mix.

TANNIC ACID.

823 M.P.F., Firozabad—Wants to have a process of preparing tannic acid.

For the manufacture of tannic acid on a large scale galls are preferably employed owing to their richness in tannin. The finely powdered material is stirred with sufficient water at 50° to 60°C. to form a concentrated aqueous extract and after filtration the clear liquid is agitated with one fourth of its volume of ether until an emulsion results. After standing for several days, the upper ethereal liquid which has separated is removed, and the lower layer, which contains all the tannin matter is run into a still and the ether which is present recovered. After cooling the syrupy liquid is spread out on sheets of tin, and heated by means of a steam coil, when the gallotannic rapidly puffs up and dries.

Thus prepared the commercial tannic acid contains some quantity of gallic acid and other impurities; to remove these the material may be washed with ether or the aqueous liquid fractionally precipitated with common salt, the precipitate dissolved in ethyl acetate, and the tannin recovered by evaporation under reduced pressure.

LEATHER BOARD.

826 I.N.T., Kanpur—Wants formulas of leather board and suede leather dressing.

Leather board is of softer texture than fibre board but even in strength throughout its substance. It is made from a good clean mixed base and is so named because of its use as a reinforcement for leather and not by reason of its leather content, which is nil. It is of a pink or fawn colouring and is usually employed in its stouter substances as a medium grade reinforcement for suitcase and similar boards.

SUEDE LEATHER DRESSING.

(a)	Nigrosin	3	grams.
	Oleic acid	3	"
(b)	Benzine	40	"
	Alcohol, denatured	100	"
	Naphtha	40	"

Melt (a), and thin with (b).

Fine quality suede can be cleaned by slightly moistening the surface and rubbing lightly and evenly over the whole of the surface. Following are good liquid suede cleaners:—

(1) Trichlorethylene.
(2) Trichlorethylene and wood naphtha in equal amounts.
(3) Rectified wood naphtha.
(4) Gasoline (Sp. gr. .620).
(5) Benzol and wood naphtha in equal amounts.

All of these with the exception of trichlorethylene are inflammable.

Suede stain restorers for dabbing over the shoe generally comprise a 4-7 per cent. of soft soap in wood naphtha, with dyestuff to match the shade of skin.

CHEWING GUM.

852 B.B., Dharapuram—Wants to have good formulas of preparing chewing gum and milk toffee.

Chicle	130	parts.
Paraffin wax	37.3	"
Tolu balsam	6.2	"
Sugar, powdered	370	"
Glucose	150	"
Water	170	"

Flavour and perfume to suit.

Soak the chicle in the water, and mix hot with the melted paraffin and the balsams.

The sugars are boiled down with the water to a syrup, and kneaded with the above mixture to a plastic mass.

MILK TOFFEE.

Sweetened condensed milk	8 lbs.
Full cream milk	1 quart.
Sugar	3½ lbs.
Glucose	4 "
Butter	½ lb.
Vanilla and salt to flavour	— sufficient

Cook to crack all the ingredients together in an earthenware vessel of enamel except the last two. Then add the butter and vanilla essence. Pour the hot mass over a buttered marble slab. Lastly cut in cubes of required size and wrap in wax or cellophane paper.

VASELINE POMADE.

865 L.G., Kanpur—Wants to have a recipe of vaseline pomade.

The basis consists of 6 to 8 parts of white vaseline and 1 part of ceresin melted together, and while melting coloured with the substances undernoted according to the floral odour desired. The quantities of perfumes here given are for not less than 2 lbs. of the basis:—

HELIOTROPE.

Oil of lemon	2½ dr.
Oil of bergamot	½ "
Oil of lemon grass	½ "
Colour—Tincture of gamboge.	

CITRON.

Oil of cassia	2 dr.
Oil of bitter almond	40 mins.
Oil of cinnamon	½ dr.
Balsam of Peru	3 "

ORANGE.

Oil of orange peel	2½ dr.
Oil of bergamot	½ "
Oil of rose geranium	½ "
Colour—Oil soluble orange aniline.	

BENDA.

Oil of bergamot	2 dr.
Oil of bitter almond	1½ "
Oil of neroli	1 "
Oil of Ylang-ylang	15 mins.
Colour—not necessary.	

ROSE.

Oil of rose geranium	½ oz.
Oil of bergamot	1½ dr.
Oil of neroli	½ "
Colour—Alkanet	2 "

TRACING INK.

901 L.V.M., Bulsar—Wants of formulas of tracing ink.

The following inks are employed for tracing the patterns on paper which can be transferred to linen, etc. by passing a hot iron over the paper:—

FOR LIGHT FABRICS.

Sandarac	30 gr.
Rosin	15 "
Melt together and add a triturate of	
Indigo	30 "
Carbon tetrachloride	3 dr.

FOR DARK FABRICS.

Sandarac	30 gr.
Rosin	15 "
Zinc oxide	30 "
Carbon tetrachloride	3 "
Prepare as above.	

CARBON DUPLICATING PAPER.

953 F.C.T., Amritsar—Desires to know the formulas and processes of making carbon duplicating paper and typewriter ribbons.

Lard oil	20 oz
Glycerine	10 "
Spirit	5 "
Graphite	10½ "
Methyl violet (soluble)	20 "

Mix well. Apply the composition over the surface of suitable paper with a stiff brush.

TYPEWRITER RIBBONS.

Type-writer-ribbons are made by saturating cotton ribbons with special type of ink. This is done by passing the ribbons under a series of rollers. One of these rollers is coated with a film of the ink paste, which the pressure of the second roller causes to adhere to one side of the ribbon after which the other side is similarly coated with the ink. Finally, the ribbon is mechanically cut into measured lengths, rolled and packed in tin boxes.

A typical formula of ink for ribbons follows:—

Petrolatum	50 parts.
Lamp black or Prussian blue	30 "
Petroleum benzine	10 "
Rect. Turpentine oil	10 "

Melt the petroleum over water bath and rub into it while hot the lamp black or Prussian blue as much as it will take without becoming so dry as to be granular. When partly cool dissolve the whole little at a time in the mixture of petroleum benzine and rectified oil of turpentine. The finished mixture should be of the consistency of fresh oil paint, when it will be ready for applying over the ribbons.

Brief Queries and Replies

3070 G.B., Nagpur—Formulas of kanku, gandha, nail polish, etc., will appear in an early issue of Industry.

3072 S.A.W., Khilos — For automatic pistols enquire of H. Abdul Rahaman & Sons, Meston Road, Kanpur and L. Narendra Lall & Co., Lohaghat, Almora. Camera may be had of Welling Camera Works, Belgaum, Bombay. Cigarette lighters are not manufactured in India.

3075 S.R.B., Guntur—Following is the process of manufacturing precipitated chalk: 20 ounces of calcium chloride is dissolved in 2 quarts of boiling distilled water and in a separate vessel 3½ lbs. of sodium carbonate in 2 quarts of boiling distilled water. The two solutions are allowed to cool. Then they are mixed together and the precipitate formed is allowed to subside. The precipitate is then collected on a calico filter, washed with boiling distilled water until the last trace of sodium chloride is removed. This chalk is used in manufacturing chalk sticks.

3079 H.K.A., Muzaffarnagar—Yes, you may start soap manufacture, oil making and cloth printing. In this connection you may consult Manufacture of Soap; Indian Perfumes, Essences and Hair Oils and Cotton Dyeing and Printing—all the books published from this office and price Rs. 3|6|- each including postage.

3081 J.P.A., Moradabad—A good formula of German silver appeared in November 1948 issue of Industry.

3085 D.B., Sambalpur—A formula of metal polish appeared in July 1947 issue of Industry.

3086 R.S.G.P., Ahmedabad—A good formula of ink eraser appeared in March 1948 issue of Industry.

3088 D.D.W.C., Jubbulpore — Wire nail making machines may be had of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta. Power driven betelnut cutting machine is not available.

3095 H.P., Trichur—You may try the following compound for perfuming the oil: Oil bergamot 6 dr.; oil lemon 3 dr.; oil rosemary 2 dr.; oil neroli 1 dr.; oil lavender 2 dr.; oil orange 1 dr.; oil rose geranium 2 dr. This compound should be used in case of 24 oz. oil.

3104 T.I., Tatanagar—Process of manufacturing ebonite will be found in Manufacture of Rubber Goods published from this office, price Rs. 3|6|- including postage.

3107 R.G.C., Dhanbad—Emery stones are prepared with emery powder using magnesite as binding agent. The feature of this process is that the pulpy mixture of magnesium chloride, chloride solution, magnesite and emery powder is placed in metal moulds, which are mounted on a jig-table, the vibration of which causes the specifically heaviest portions of the mixture, viz., the grains of emery, to settle down gradually to the bottom of the mould as compactly as possible each grain having time to assume the most suitable position with regard to its neighbours. This process gives an emery stone consisting of 90 per cent of emery and only 10 per cent of magnesite binding medium, the superfluous portions of the latter being forced upward by the jumping movement of the table and then easily moved.

3114 K.D., Monghyr—Addresses of Indian merchants and newspapers will be found in Industry Year Book and Directory.

3121 K.S.T., Amritsar—Following is a formula of hair fixer:—Distilled water 700 parts; glycerine 30 parts; borax powdered 25 parts. Make a solution and add tincture of benzoin 225 parts with good stirring then add perfume 10 parts. Allow to stand for 3 to 5 days. Filter and bottle.

3125 S.T.C., Surendranagar—All the industries mentioned by you have good prospect. You may however start cardboard box making, hosiery manufacture, candle manufacture, etc. Cardboard box making and candle making machines may be had of Oriental Machinery Supplying Agency Ltd., 12, Mission Row Extension, Calcutta. Hosiery machines may be had of A. N. Sayal & Co., 76, Ramnagar, New Delhi 2.

3129 G.U.C., Erode—Following is a formula of sugandhi dhoop: Benzoin 100 parts; balsam-tolu 50 parts; charcoal 700 parts; saltpetre 50 parts; sandal wood oil 50 parts; patchouli oil 15 parts; cascarila oil 50 parts, musk grain 5 parts. Mix and fill in paper tubes. Process of manufacturing all kinds of fountain pen ink will be found in Manufacture of Ink, published from this office, price Rs. 3|6|- including postage.

3130 H.V., Madhapur—Process of manufacturing white lead will appear in an early issue of Industry.

3132 H.O.R., Ponduru—Yes, you may start a match factory in your place. For machines you may enquire of Standard Machinery Co., 86B, Netaji Subhas Road, Calcutta. You may consult Safety Matches and Their Manufacture by K. C. Das Gupta published from this office, price Rs. 5/- including postage.

3139 B.K.D., Rameswar—For iron sheets enquire of Calcutta Iron Syndicate, 17, Maharsi

Debendra Road and Beni Madhab Sett Satya Charan Sett, D-4, Jagannath Ghat, both of Calcutta. For preparing concentrated solution of mercuric chloride take 8 oz. water and put into 4 dr. mercuric chloride. Potassium sulphocyanide is soluble in water. You have to use Whatman No. 40 filter paper for filtering the precipitate. You may dry the precipitate in the sun. Then you have to make pill in a pill making machine. Note that mercuric chloride is highly poisonous. Chemicals may be had of Calcutta Chemical Co., Ltd., 6, Bonfield Lane, Calcutta.

3140 3130 K.H.N.S., Bikaner—We are not aware of any German firm doing business with India. Glass bottles may be had of Agarwal Glass Works, 428, Kalbadevi Road, Bombay and Calcutta Manufacturers Agency, 19, Parsee Church Street, Calcutta. Indigenous perfumes may be had of Banshidhar Dutt, 126, Khengrapatty St., Barabazar, Calcutta. You may enquire of Sikri & Co., 55, Canning St., Calcutta for American perfumes. Cardboard boxes may be had of Bengal Cardboard Industries & Printers Ltd., 165, Cornwallis Street, Calcutta; Gogate Paper Box Works, Princess Street, Bombay and S. Antool & Co. Ltd., 91, Upper Circular Road, Calcutta. For refined oil enquire of Swaika Oil Co., 28, Pollock Street, Calcutta. Ink manufacturing ingredients may be had of Champalal Agarwala, 45, Armenian Street, Calcutta. Paper may be had of Mukherjee Dutt & Co., 31, Jackson Lane, Calcutta. Vaseline may be had of B. K. Paul & Co.Ltd., 1 & 3, Bonfield Lane, Calcutta. Dry pollen of keora may be used. For preserving syrup you may add 1/1000 part salicylic acid in 1 part sugar used in manufacturing syrup.

3145 J.T., Bijnor—Gelatine may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta. Barium sulphate may be had of Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane, Calcutta.

3149 A.J., Raipur—We are not aware of any such institution.

3159 K.C.L., Khurda—Packing boxes may be had of Belliaghata Packing Box Mfg. Co., 28B, Chaulpatty Road, Calcutta and Packing Box Mnfg. & Co., 26A, Wellesley Street, Calcutta. Paper may be had of Mukherjee Dutt & Co., 31, Jackson Lane, Calcutta. Readymade garments may be had of Abdul Rahim & Sons, 171A, Dharamtolla Street and Osman Mullick & Co., 6, Dharamtolla Street; both of Calcutta.

3162 K.G.G., Lucknow—Following is the process of manufacturing camphor: Camphor is generally obtained from a species of tree found chiefly in the island of Formosa. To extract camphor the wood is cut into small pieces and boiled with water in iron vessels which are covered with large earthen domes, lined with rice straw. The crude product is next purified. For this purpose 100 parts of crude camphor are mixed with 2 parts each of quicklime and animal charcoal and the mixture is put in a glass vessel placed over a sand bath. The heat is then continuously applied, the camphor is sublimed off and deposited on the upper part of the vessel when the process is complete, the vessel is removed and allowed to cool.

3163 L.C.A., Delhi—We have no book on type foundry. You should consult an expert for starting this business. For starting casting of aluminium and lead you should use a furnace. The process of manufacturing aluminium powder will appear in an early issue of Industry.

3169 G.T., Jamnagar—Groundnut oil cake is used as manure.

3174 S.R., Barisal—Process of silvering glass appeared in May 1947 issue of Industry.

3175 R.B.G., Tundla—You may start any one of the industries mentioned by you. Ice cream making machines may be had of Refrigerators (India) Ltd., 59C, Park Street, Calcutta. For this industry you have to invest at least Rs. 15,000|-.

3176 G.S., Chakradharpur — Process of deodorising coconut oil will be found in November 1946 issue of Industry.

3181 R.L., Drug—Following is a formula of stoneblast powder: Potassium nitrate 15 parts; charcoal 15 parts; sulphur 10 parts. The ingredients should be very finely powdered and mixed thoroughly.

3186 S.O.R.C., Tutocorin—Process of manufacturing paper pulp will appear in next issue of Industry.

3192 R.G.S., Moradabad — You have to use carmine which may be had of Champalal Agarwala, 45, Armenian Street, Calcutta.

3196 K.B.S., Manipur—Process of vulcanising rubber tyres and tubes will be found in Manufacture of Rubber Goods published from this office, price Rs. 3|6|- including postage. As regards loan you may negotiate with Beleghata Banking & Trading Co. Ltd., Beleghata Canal Bridge, Calcutta.

3199 C.A., Delhi—Formulas and processes of manufacturing cream and saccharine will appear in an early issue of Industry.

3201 M.C., Delhi—Process of manufacturing sal ammoniac bars will appear in an early issue of Industry.

3203 S.P.S., Behar-Sharif—A formula of sewing machine oil will appear in due course.

3208 K.N.W., Sukkur—Formulas of glue, cube sugar and milk sugar will appear in an early issue of Industry.

3211 S.S.D., Jullundur—All the chemicals you require may be had of Bengal Chemical & Pharmaceutical Works Ltd., 164, Manicktala Main Road, Calcutta.

3217 V.S., Partabgarh — Sajikimati is fuller's earth. Caustic soda may be manufactured from fuller's earth. But it is not commercially profitable. We have no book dealing with the manufacture of plywood. Boilers may be had of Marshall Sons & Co. (India) Ltd., 99, Netaji Subhas Road, Calcutta. Thank you for your good suggestion.

3218 B.C.T., Balasinor—For cement casting machineries you may enquire of Balmer Lawrie & Co., Ltd., 103, Netaji Subhas Road, Calcutta. The firm will supply you detailed information you require.

3220 S.C., Amritsar—Punjabi equivalents of logwood, Brazil wood and lodh wood are not available. These may be had of Banshidhar Dutt, 126, Khengrapaty Street, Calcutta.

3224 H.A.A.S., Nigeria—Your enquiry is in the nature of an advertisement. So we can not publish your enquiry in these columns.

3229 D.N.C., Hazaribagh—We have no book on mica industry. You may however consult Indian Mica by R. R. Chowdhury to be had of Book Co., Ltd., 4-4A, College Square, Calcutta.

3230 K.C.W., Alwar—Molasses are fermented by wine yeast, then by the process of distillation alcohol is manufactured. For cigarette making machines enquire of Hindusthan Export & Import Corp. Ltd., Albert Bldgs., Hornby Road, Bombay.

3231 A.K.S., Montgomery—Process of manufacturing matches will be found in Safety Matches and their Manufacture by K. C. Das Gupta published from this office, price Rs. 6-6 including postage.

3232 Y.F.T.A., Shillong—Following is a list of agents of foreign goods: Gas Accumulator Co. (India), Ltd., 19, Ekbalpore Road, Calcutta; Jawant Trading Co., Vithaldas Chambers, Apollo Street, Bombay; Grahams Trading Co. Ltd., 16, Bank Street, Fort, Bombay; Carr & Co., Wittet Road, Fort, Bombay; Muller & Phipps Ltd., Ballard Estate Bombay; Atlantis (East) Ltd., 20-1, Chetla Road, Calcutta and Volkart Bros., 8, Netaji Subhas Road, Calcutta.

3235 D.K.B., Burdwan—Exhausted dry cell cannot be recharged.

3236 G.C.S., Tumsar—Process of silvering mirror will appear in an early issue of Industry.

3238 A.A., Delhi—Process of oxidisation of iron, copper, brass, etc., will appear in an early issue of Industry.

3242 T.R.S.R., Anakapalle—For vermicelli making machines enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta. Cardboard boxes may be had of Bengal Cardboard Industries & Printers Ltd., 165, Cornwallis Street, Calcutta and S Antool & Co., Ltd., 91, Upper Circular Road, Calcutta.

3246 J.D., Rajkot—Process of manufacturing rubber balloons will appear in an early issue of Industry.

3248 K.L., Madras—Sodium silicate is used in manufacturing soap. You may start a sodium silicate factory in your place. In manufacturing sodium silicate following raw materials are used; Silica, sodium carbonate, coal or wood charcoal.

3249 H.M.S., Bangalore City—Milk product manufacturing appliances and machines may be had of Edward Keventers Ltd., 11/3, Lindsay Street, Calcutta.

3256 S.S., Samalkot—Hydrogen gas is filled in rubber balloons. Process of making hydrogen gas will appear in an early issue of Industry.

3257 T.R.A., Madura—In one maund soap you have to use 50 grains soap green.

3258 R.P., Patna City—Process of refining kerosene oil will appear in usual course.

3260 N.P.V., Muzaffarpur—Candle making moulds may be had of Small Machineries Mfg. Co., 32, R. G. Kar Road, Calcutta. In manufacturing candles hard paraffin is used. We have no book on candle manufacture.

3261 A.M.S., Tellicherry—Process of manufacturing rubber stamps will be found in Manufacture of Rubber Goods published from this office, price Rs. 3|6|- including postage.

3263 S.I.W., Rawalpindi—Formulas of hair dyeing powder and oil will appear in usual course.

3268 S.L.M.S., Nagaur—Process of manufacturing insulation varnish will appear in usual course.

3269 U.N.G., Cooch Behar—We have no book on candle manufacture. Hard paraffin is melted and poured in candle moulding machine fitted with wick.

3286 K.K.G., Bulandshahr—A good formula of phenyle will appear in an early issue of Industry.

3288 M.R.M., Silchar—Burn borax and powder very finely. Apply this with honey to the sore tongue.

3290 M.M.D., Calcutta—Formulas of taral alta, vermilion, etc., will appear in an early issue of Industry.

3291 C.S.S., Calcutta—Process of manufacturing catchet will appear in an early issue of Industry.

3296 R.K., Kanpur—Refer your query to Indo-Japanese Commercial Co., Omrigarh Building, Bombay 3.

3279 K.P., Punalur—You should read some books on dairy and poultry farming. For books enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta and W. Newman & Co., Ltd.. 3 & 4, Old Court House Street, Calcutta.

3300 M.L., Ballia—Process of developing photo prints will appear in an early issue of Industry.

3302 H.B., Jharsuguda—Process of manufacturing chewing gum will appear in an early issue of Industry.

3309 K.D.W.M., Kanauj—Process of manufacturing gramophone record will appear in an early issue of Industry.

3311 F.I.P., New Delhi—Process of removing stains from stones will appear in an early issue of Industry.

3316 U.T.M., Shwebo—Process of making grafting wax and photographic printing paper will appear in an early issue of Industry.

3317 S.M., Poona City—You may take up agency business as your part time work and thereby supplement your income.

3318 F.C.G.R., Tatanagar—You may better seek legal advice.

3325 A.K.P., Kanpur—Process of manufacturing water colour tablets will appear in an early issue of Industry.

3327 B.D.M., Jubbulpore—You may start ink manufacture with Rs. 500. Following is a formula of writing ink : Tannic acid 1.55 oz.; gallic acid 0.50 oz.: ferrous sulphate 2.00 oz.; hydrochloric acid dilute 1.67 oz.; phenol 0.13 oz.: ink blue 0.47 oz. Dissolve the tannic and gallic acids in about 3 parts of hot water and add to the dilute hydrochloric acid (of about 7°Be) and then add the solution of ferrous sulphate and phenol in another 2 parts of hot water. Bring up to 1 gallon. mix well and let stand quietly for 16 days. Then decant without stirring up any sediment formed. Finally dissolve the blue and strain through cloth before bottling.

3329 C.T.B.S., New Delhi—You have to invest at least Rs. 25000/- for starting homeo firms in Calcutta. There is perhaps no such factory in your locality. So you may start a factory in your place.

3332 A.M.I., Baripada—Specifications of china clay used in different industries are not available.

3333 D.S.. Ludhiana—Process of manufacturing phenyle, mosquito oil, spray, etc.. will be found in Manufacture of Disinfectants and Antiseptics published from this office, price Rs. 3/6/- including postage.

3304 J.M.P., Mokameh — Pharmaceutical chemicals may be had of B. K. Paul & Co. Ltd., 1 & 3. Bonfield Lane, Calcutta. Plywood may be had of National Plywood Mfg. Co., 3-8, Taltala Lane, Calcutta and Luralda Ltd., 28, Dalhousie Square, Calcutta. You may consult Industry Year Book & Directory published from this office, price Rs. 12/-.

3344 M.S.C., Coimbatore—Process of manufacturing rubber baloons will appear in an early issue of Industry.

3350 B.A., Bobbili—For fire works enquire of Sree Kaliswari Colour Match Works, Sivakasi, Ramnad and Vishnu Brand Fire Works & Allied Chemicals Factory, 80, Fifth Main Road, Chamarajapet, Bangalore. You may consult Manufacture of Syrup and Cold Drinks published from this office, price Rs. 3/6/- including postage. The agent for yardly products is G. Atherton & Co., Ltd.. 4, Mission Row, Calcutta. Wants to be put in touch with the agents of Pompian products.

3351 S.K.B., Patna—You may use ghee flavour which may be had of Paradise Perfumery House, 7, Colootola Street, Calcutta.

3352 L.N.O., Bhagalpur—We have no information regarding the dealers of wind-driven battery chargers.

3353 B.A.P., Madras—You may manufacture ink, Bindi, etc., on small scale and sale in the market. We have no such book.

3354 S.V., Lucknow—Formulas you require will appear in an early issue of Industry.

3359 S.N., Salem—For tin sheet enquire of Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta. For purchasing machine enquire of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta.

3366 N.P.M.P., Bombay—Good lead pencils have prospects in India. But quality should not be inferior to that of foreign makes. For mixing graphite and china clay you should use, mixing machine.

3369 N.S.F., Navsari—You may use 5 p.c. castor oil in manufacturing soap. This will enhance transparency of soap. After manufacturing you may polish by rubbing with a piece of cloth moistened with coconut oil.

3371 P.P.C., Meerut—Rubber baloon making moulds may be had of B. V. Misal, Wardha. You need not use any other machine. Formula will appear in an early issue of Industry.

3375 V.K.C., Delhi—You may start magnet wire enamelling and tinning industry in your place. As regards machines and other equipment you better consult an expert in this line. You may also start plastic industry. An article on plastic industry appeared in December 1948 issue of Industry.

3376 R.N., Nachiyapur—You may manufacture soap with Rs. 8,000/-. In this connection you may consult Manufacture of Soap published from this office, price Rs. 3/6/- including postage. Soap making materials may be had

Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane, Calcutta. Soap making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

3382 D.G.K.R., Vizianagram—For starting a match factory you require about Rs. 5 lakhs. You may consult Safety Matches and Their Manufacture by K. C. Das Gupta, published from this office, price Rs. 5-6 including postage. Like amount will be required for starting battery or vanaspati manufacture.

3385 N.F.H., Dharmapuri—You may consult Industry Year Book & Directory and also Thacker's Directory. For fancy goods enquire of Hajee Janmahomed Latiff, 299, Abdul Rehman Street, Bombay and Abasbhoy Gulamalli, 253, Abdul Rehman Street, Bombay.

3386 A.F., Karachi—Process of colouring plastic frame is not possible. However your enquiry is receiving our attention.

3387 G.B., Kanpur—Process of manufacturing rubber baloons will appear in an early issue of Industry.

3389 P.C.S., Ajmer—Process of manufacturing florescent tubes, etc., may appear in an early issue of Industry.

3397 L.K.K., Poona—You may start boot polish and metal polish manufacture with small capital. We have no book on horn industry. Process of manufacturing boot polish and metal polish will be found in Prospective Industries published from this office, price Rs. 3|6|- including postage.

3411 H.M.W., Ludhiana — Process of manufacturing metal labels, stencils, etc., will appear in an early issue of Industry.

3421 R.M., Sambalpur—A formula of tobacco preparation will appear in an early issue of Industry.

3426 P.V.R.R., Ambalur—Products manufactured from rubber latex is called latex products. These include rubber baloons, niples, dropper, etc. Wants to be put in touch with the manufacturers of artificial coral.

3427 S.G.J., Malwa—For lead pencil making machines enquire of Alfred Herbert (India) Ltd., 13/3, Strand Road and Francis Klein & Co. Ltd., 1, Royal Exchange Place; both of Calcutta. Process of manufacturing lead pencil will be found in Industry Prize Article 1944 published from this office, price Re. 1/14/- including postage. For winding machines enquire of W. H. Brady & Co. Ltd., Mercantile Bldg., Lall Bazar, Calcutta.

3428 N.J.V.C., Murtazapur—Sheet glass is manufactured by United Provinces Glass Works Ltd., Bahojoi, Moradabad, and Victoria Glass Works, 8, Lyons Range, Calcutta. For sheet glass enquire of Abdulhussain Karimji Arsiwala, 136, Abdul Rehman Street, Bombay. For chemicals and drugs enquire of Rasiklal & Co. Ltd., Varjivan Mansion, Princess Street, Bombay 2. Vernacular name of barium sulphide is not available. Process of enamelling gold and silver will appear in an early issue of Industry.

3432 P.M.I., Kunnamkulam—Lozenge making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. You may consult Manufacture of Confectionery published from this office, price Rs. 2/6/- including postage.

3433 S.K., Amritsar—Process of manufacturing all kinds of ink will be found in Manufacture of Ink published from this office, price Rs. 3/6/- including postage.

3440 S.M.D., Ambala—For oil engine enquire of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta. Formulas of printing ink and paper varnish will appear in an early issue of Industry.

3442 K.R.A., Jodia—Casein is manufactured from cream-separated milk with the help of rennet or hydrochloric acid. Casein is used in manufacturing waterproof glue.

3445 F.S., Gauhati—We have no book on tea blending. Tea blending requires practical experience. For tea packing machine enquire of McLeod & Co., 28, Dalhousie Square, Calcutta. In packing tea you should not use wax paper.

3446 G.S.B., Pondicherry—You may consult any text book on electricity for particulars regarding construction of electric calling bell.

3451 M.L.R.N., Kanpur—Process of manufacturing bar soap will be found in Manufacture of Soap published from this office, price Rs. 3-6 including postage.

3453 H.C., Shikarpur—You perhaps want washing soda. Process of manufacturing sodium carbonate appeared in July 1948 issue of Industry.

3470 N.S., Negapatam—For looms enquire of W. H. Brady & Co. Ltd., Mercantile Bldg., Lall Bazar, Calcutta.

3471 J.C.S., Jullundur—For button making machines enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. This firm will supply you with an estimate for starting a button factory with the machines supplied by them. As regards technician you should advertise in newspapers. Wants to be put in touch with the suppliers of damn nuts suitable for manufacturing nut buttons.

3474 C.R.G., Calcutta—Process of manufacturing lemon oil, rose oil, neem oil, etc.; will appear in an early issue of Industry.

3476 G.R.S.C., Gaya—We have no book on candle manufacture. In manufacturing candles you have to melt hard paraffin and pour to candle moulding machine fitted with wick.

3479 A.F.B., Bombay—You have to obtain import license for which write to the Controller of Imports, New Delhi.

3483 N.G., Guntur—You may start a soap factory with Rs. 2000/- on a small scale.

3486 A.P.G., Allahabad—In order to make tablets make a pasty mass by adding gum water. Dry this mass, when completely dry break the mass to small granules. These granules should be put in a tablet making machine when tablets will be made.

3488 A.P., Bombay—Following is a formula of good nail polish: Celluloid film 200 gr.; Amyl acetate 2 oz.; Acetone 5 oz.; Spirit red 80 gr. Clean the celluloid film by soaking it in soda solution for 2 or 3 hours, then scrape with a blunt knife. Dry in the sun. Then cut it into small pieces and weigh out and put in the mixture of acetone and amyl acetate in a well stoppered bottle. Then add the colour. Keep aside for a day or two, then strain and bottle.

3490 P.B.R., Dhakuria—For oil extracting machine enquire of Marshall Sons & Co., Ltd., 99, Netaji Subhas Road, Calcutta. Process of oil extraction will be found in Vegetable Oil Industry published from this office, price Rs. 3/6/- including postage.

3492 P.V.R., Allahabad Cantt.—Process of manufacturing handmade paper will appear in an early issue of Industry.

3494 S.M.S., Calcutta—Process of manufacturing gas mantles has appeared elsewhere in this issue of Industry.

3499 A.A.K., Bombay—Process of manufacturing rubber dolls will be found in Manufacture of Rubber Goods published from this office, price Rs. 3/6/- including postage.

3500 S.N.D., Lucknow—You may start a block making concern at Delhi. For machines enquire of Calcutta Photographic Stores & Agency Co., Ltd., 154, Dharamtala Street, Calcutta and John Dickinson & Co., 6, Clive Row, Calcutta.

3506 A.M., Sialkot City—You may apply black Japan and put in stove.

3512 N.P., Bombay—You may start a soap factory and peppermint manufacture in your place. For soap machines enquire of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. For starting the above industries you have to invest at least Rs. 25,000/-. Process of manufacturing soap will be found in Manufacture of Soap published from this office, price Rs. 3/6/- including postage.

3515 B.I.S.J.S., New Delhi—Process of refining all sorts of vegetable oil will be found in Vegetable Oil Industry published from this office, price Rs. 3/6/- including postage.

3518 N.P.J., Benares—You perhaps require lozenge making machines which may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

3523 A.I., Madras—For aluminium circles enquire of Aluminium Manufacturing Co., Ltd., 4, Fairlie Place, Calcutta; Jeewanlal (1929) Ltd., 101, Netaji Subhas Road, Calcutta and National Pipes and Tubes Co., Ltd., Stephen House, Calcutta. For sheet metal working machines enquire of Alfred Herbert (India) Ltd., 13-3, Strand Road, Calcutta and The Industrial Syndicate, 119-B, Ripon St., Calcutta.

3526 I.N.A., Calcutta—Tin can making machines may be had of Alfred Herbert (India) Ltd., 13-3, Strand Rd., Calcutta, and Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta. The firms will supply you with an estimate for starting a factory with their machines.

3527 B.E., Burdwan—You should use bed-bug killing powder as it is. You need not dissolve it in water.

3530 P.K.S., Dacca—For musk enquire of Assamwala 10 miles, Kalimpong, Darjeeling and Mindulal Jauglal, 11, Uppor Chitpore Road, Calcutta. You may use any kind of musk flavour in making kimam. Following is a list of Kimam manufacturers: Badalram Lachminarain, Benares City; Neck Tie Zarda Factory, 141, Howrah Road, Howrah and S. Abdul Shakoor & Co., Jaipore, Benares City. Glass phials may be had of Calcutta Glass & Silicate Works, 9, Kundu Lane, Calcutta and Victoria Glass Works, 8, Lyons Range, Calcutta.

3532 R.N.F.S., Gaya—We are not aware of any institution where training is given to a cinema operator.

3537 S.B., Malhar—Following is a formula of chalk crayons: Precipitated chalk 8 oz.; China clay 5½ oz.; Oleic acid 6½ oz.; Caustic soda 1 oz.; Water q.s. Mix the oleic acid and caustic soda, after warming them separately. Then add to the clay and chalk mixed with enough water to bring to about the consistency of putty. The mixing must be done in a standard type dough mixer or other clay mixing equipment. Then cut into sticks of the usual size and bake over moderate heat. Following is a formula of slate pencil: Powdered slate 60 parts; powdered limestone 30 parts; sodium silicate 10 parts. Knead together all the ingredients to form a plastic mass and then force it through metallic tubes of suitable diameter filled with pistons. Afterwords cut off into small lengths and bake over a slow fire.

3538 F.K., Haripur—Following is a formula of table vinegar: Ginger 1 oz.; pimento 1 oz.; long pepper 3 oz.; black pepper 3 oz.; mustard 3 oz.; vinegar 8 pints. Bruise the spices and simmer gently in the vinegar for 10 minutes, cool and strain. The vinegar prepared

this way is used with any vegetable. As gards pile specific consult a physician.

3541 D.P., Daltonganj—For wood working achines enquire of Oriental Machinery Suplyg Agency Ltd., P12, Mission Row Extension. alcutta and Alfred Herbert (India) Ltd., 13/3, rand Road, Calcutta.

3550 K.C.L.C., New Delhi—Lime is obtain- by burning limestone. Quick lime is in ony form and is slaked easily by adding ater. Lime is mainly used for building conruction. For books on industrial and technical bjects enquire of International Book House, Lane, Opp. Clock Tower, Bombay; W. ewman & Co., Ltd., 3, Old Court House Street, alcutta and Thacker Spink & Co., (1933) Ltd., Esplande East, Calcutta.

3552 R.S.C., Coimbatore — Moisten the mphor powder with rectified spirit and make blets by pressure.

3553 B.S.W., Kurneol—Following is a rmula of fountain pen ink: Tannic acid 2¼ oz.: llic acid 1 oz.; ferrous sulphate 3¼ oz.; hydroloric acid dilute 2½ fl. oz.; gum arabic 2 oz.; rbolic acid 75 grms.; and blue ¼ oz.; distilled ater to make 100 oz. Disslove the tannic and llic acids in 5 oz. of distilled water. Dissolve e ferrous sulphate and gum arabic in about oz. cold water. Add the hydrochloric acid d immediately mix the two solutions. Add e carbolic acid, blue and sufficient water to oduce 100 ounces. Keep aside for a fortnight; en filter and bottle.

3554 S.N.M., Surat—For preparing candles u should melt hard paraffin and pour in the uld fitted with wicks. Candle moulding chines may be had of Oriental Machinery pplying Agency Ltd., P12, Mission Row tension, Calcutta.

3556 I.S.I., Murshidabad—You may ask y question of industrial line.

3559 P.B.P., Ahmedabad—Process of manucturing varnish for roller used in the spinng machine will appear in an early issue of lustry.

3582 B.M., Cambay—An exhaustive article plastic manufacture appeared in December, 48, issue of Industry. If you go through that icle you will get all the information required.

3584 P.G.N., Vizianagram—Yes, you may rt a rubber stamp making concern at your ace. For equipment and other necessary pliances write to B. Goray & Co., 156, Cornllis Street, Calcutta.

3592 G.B.C., Tirupapuliyur—Following is process of manufacturing assafoetida: Assatida is extracted from a species of herb which found wild in Estern Persia, Kharsan and other localities. It prefers a stony arid soil and is found at an altitude of 7000 ft. Asafoetida is obtained by wounding the upper part of the root, from which a small quantity of gum escapes and is collected. The living root is then sliced daily or every two or three days with the exudation adhering to it, till exhausted. Whole mass consisting of alternate layers of root and gum resin is packed in skin. As found in the market, the resin consists of blackish brown brittle mass of extremely fetid odour, always mixed with slices of the root.

3595 C.R.G., Calcutta—We do not understand why you could not work out the formula successfully. Glue and orrisroot may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta. Other ingredients may be had of Chandi Charan Nayak, 124/1, Bowbazar Street, Calcutta. Formulas of hair curling lotion, aniline black, etc., will appear in an early issue of Industry.

3594 G.S.S., Madras—For nib making machinese enquire of Alfred Herbert (India) Ltd., 13/3, Strand, Road, Calcutta. This is mainly a mechanical process. For metal sheets enquire Gopal Chandra Dass, 24, Raja Woodmunt Street, Calcutta.

3595 I.H., Karachi—Following is a recipe of fruit salt: Tartaric acid 2 oz., sodium bicarbonate 2 oz.; magnesium sulphate 1 oz.; potassium bitartrate 2 oz.; magnesium citrate 2 oz.; white sugar 4 oz. Reduce the ingredients into fine powder and mix thoroughly.

3599 R.N.T., Ghazipur—You may refine sodium carbonate and potassium carbonate and sell in the market. Process of tempering steel will appear in an early issue of Industry.

3602 Dr. S.G.I., Bara Banki—For manufacturing candles you may use stearic acid with hard paraffin.

3603 M.A.H. Pabna—Shati is manufactured from Shati roots. These are thrashed in a dhenki and the starch is obtained by washing the roots and settling the water. The starch should be washed several times till shati looks brilliant and without bitter taste.

3611 R.P.V., Ludhiana—Following is a list of patent and trade mark agents: De Penning & De Penning, 10, Govt. Place East, Calcutta. For labels enquire of R. G. Paul & Co., 110/2, Grey Street, Calcutta. Rubber stamp is manufactured by B. Goray & Co., 156, Cornwallis Street, Calcutta. For boot lace manufacturing machine enquire of W. H. Brady & Co., Ltd., Mercantile Bldg., Lall Bazar, Calcutta. Process of manufacturing all sorts of rubber stamp ink will be found in Mandfacture of Ink

published from this office, price Rs. 3/6/- including postage.

3612 K.S., Cuddalore — Your enquiry regarding gum asprophine and robusta flats is engaging our attention.

3614 P.S.C.W., Patiala—Mustard oil does not require refining when used for edible purpose. You may filter the oil through filter press.

3615 H.D., Cherrapunji—Following is a formula of chalk crayon: Soapstone 14 lbs.; precipitated chalk 14 lbs.; gypsum 20 lbs.; Water q.s. Mix and make into stiff paste with thin glue or gum. mould and dry gradually.

3623 T.S.R., Madras—Defect of dry cells manufactured by you is due to defective raw materials used and also defects in manipulation.

3624 A.S.J., Ferozepore Cantt.—You need not take any license for starting a lending library or a book selling shop. Following is a list of booksellers and publishers:—A. H. Wheeler & Co., 11, Netaji Subhas Road, Calcutta; Book Co.. Ltd., 4-3B. College Square; Thacker Spink & Co., (1933) Ltd., 3, Esplanade East, Calcutta; W. Newman & Co., Ltd., 3, Old Court House Street, Calcutta; Standard Literature Co., Ltd., 13/1, Old Court House Street, Calcutta. and Vora & Co. Publishers Ltd., 3, Round Bldgs., Kalbadevi Road, Bombay. Exhaustive list will be found in Industry Year Book & Directory published from this office.

3628 R.K.K., Kanpur—To refine paraffin wax melt it over slow fire and digest it with 1/10 of its weight of animal charcoal in a liquid state. When the purification is complete, the paraffin is strained through linen and crystallised.

3630 S.B.M.S., Chittagong—Separators are made from non-conducting porous materials, i.e., wood pulp from fir. cedar, cypress etc. These are made in the form of thin sheets with the ribs running vertically and next to the positive plates. The essential characteristics of a wood to be used for battery separators are good permeability, freedom from volatile acids, a low percentage of resinous matter, sufficient mechanical strength, good machining qualities and resistance to the action of the electrolyte. The quantity of tanning and other colouring matter in the wood should also be reasonably small, so that they can be removed by a short period chemical treatment. The finished separator should be straight grained free from knots and free of seasoning defects such as creacks and shakes. For machines and other particulars enquire of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta.

3632 M.A., Bijnor — Formulas of photo developing and printing solutions will appear in an early issue of Industry.

3633 S.M.A., Monghyr — A formula of vanishing cream appeared in September, 194[illegible] issue of Industry.

3638 R.C.C., Jaora—An exhaustive article on plastic industry appeared in December, 194[illegible] issue of Industry.

3642 M.R. Jamshedpur City—Coir rope making is profitable. You have to collect coir from the places where coir is available in abundant quantity. For this you may try Midnapur and 24 Parganas of W. Bengal. For machine you may enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

3644 D.G.B., Jaipur—You may start a bone crushing factory. Bone meal is used as manure. For machines enquire of Marshall Sons & Co. Ltd., 99, Netaji Subhas Road, Calcutta. For selling bone meal you should advertise in newspapers. Detailed process will be found in Utilisation of Common Products published from this office. price Rs. 3/6/- including postage.

3653 S.P., Delhi—All the formulas published in our books are practical. Success in their working depends upon manipulation. You may try the formulas published in our books and if you find any difficulty you may refer to us when we shall try to solve these difficulties.

3659 H.L.C.C., Rampur State — Questions are replied by post on receipt of 8 annas postage stamps for each question.

3661 P.R.K.M., Kolar — Hair removing powder will remove the hair temporarily and will grow again. Moreover repeated use will stain the skin.

3669 A.K.K., Giridih—You have to take license from Post Office for installing radio in your house.

3670 S.V.B.I., Lucknow — Formulas of empire cloth, insulating tape. solid phenyle, etc. will appear in an early issue of Industry.

3672 G.S.S., Unao—You may start hair oil manufacture with Rs. 2.000/-. You may also start manufacture of ink of all kinds.

3673 V. R. N. R., Vizagapatam — For machines required for block making and printing type manufacture enquire of John Dikinson & Co., 6, Clive Row, Calcutta and Photographic Stores & Agency Co., Ltd.. 154, Dharamtala Street, Calcutta.

Review of Books

STATISTICS. Published by Vora & Co., Publishers, 3, Round Building, Kalbadevi Road, Bombay 2. Pages 481, price Rs. 10-8.

Importance of statistics is being increasingly realised in all spheres of life particularly in the spheres of trade, industry, commerce, science and administration. As a matter of fact, no correct formulation of policies with regard to such matters of vital importance, is at all possible in the absence of reliable statistics. Statistics, so to say, forms the life-breath of our national economy.

That its need is highly appreciated is testified by the fact that the University authorities have incorporated this subject in the curriculum. Students equipped with statistical knowledge are expected to have a clearer insight into our country's problems and in their future career may have an excellent opportunity to serve their own country by making scientific approach to these numerous problems.

The exigencies of the situation however need a wider diffusion of this subject. But the fact is that the subject still rests in unapproachable majesty.

Keskar, author of 'Statistics' is, however, of opinion that the myth of its inaccessibility can be exploded if a lot of suitable books of elementary character is published. The general feeling about this subject is one of repulsion. But author Keskar in his own book 'Statistics' has practically succeeded in presenting this subject in a pleasing and interesting manner, so that it ceases to be a dead-weight on the juvenile beginners. Attempts have been made to present this subject in a systematic manner, explaining the successive natural phases in the evolution of accurate statistics. The successive phases, e.g., collection, classification and tabulation, have been clearly and lucidly explained by the author. When a mass of statistical matter is collected, it does not in that state serve any useful purpose unless it is properly classified. And it is by the final process of tabulation that the matter is put in logical order according to the units of measurement.

But in statistics tabulation does not always suffice. So we have to take recourse to other devices, as for instance diagrams to serve the purpose of symbolic representation. Chapters II and VIII of this book contain in full the procedure of diagrammatic representations, their utilities and comparative advantages being fully explained.

In the chapters that follow, the author proceeds on to explain various other statistical methods viz. Average, Dispersion, Skewness, Co-relation, and Index number which are highly important and indispensable from statistical point of view. Average, Dispersion, Skewness, etc., as the author defines them, are all summary expressions used for several purposes. Separate chapters have been devoted to a clear exposition of the significance and utility of each of these statistical methods.

From a close perusal of the book it appears that there is no place for esotericism even in the study of such a difficult subject as 'Statistics'. The average readers may also equally profit themselves by acquainting themselves with the fundamental principles and theories of statistics.

We welcome this publication and commend it to our readers.

THE INDIAN LAW REVIEW. Published by Indian Law Publications Ltd., 8, Hastings Street, Calcutta. Pages 118, price Rs. 6.

It is one of the foremost journals devoted especially to discussion of the current, legal and constitutional problems with particular reference to India. The journal, under review, deals with the grave and weighty matters relating to India's future constitution. The most impressive and illuminating articles discussed in this particular volume may be stated as follows:—"Notes on some articles of the Draft Constitution", "Some features of Draft Constitution" and "The Draft Constitution", etc. The writers of the above articles are all intellectuals of outstanding ability and acumen. As such, views contained in those writings, are based on sound and mature critical judgment. Indian constitution has not yet reached its finality. It is still in the making. At this crucial phase, the framers of the constitution should make it point to see that no error creeps in and mar the purity and sanctity of the "Constitution" which we intend to hand down to our generation as their richest legacy. So the framers should by all possible means make it a point to invite criticism and suggestions from the outstanding intellectuals of the country. The articles contained in this particular volume

points out specifically, the flaws and defects of the specific provisions of the Draft Constitution, and offers concrete suggestions.

If we have understood aright, throughout almost all the writings, there is an undercurrent of a strong feeling that judiciary in the country, should be given the supreme position and made the voice of the Constitution. But the Draft Constitution, as it stands, seems to confer supreme powers on the Executive and allots 'Judiciary' a somewhat subordinate position.

The writers strongly feel that conferment of supreme powers on the judiciary alone, will be the best guarantee for public liberty and freedom. Besides these thought-provoking writings on 'Constitution', there is one on "Democracy and Communism". Now-a-days there is a good deal of confussion of thought about these two 'isms' of the world. And we are grateful when an intellectual like Sir H. S. Gour comes forward and clears up the tangle.

This journal provides food for thought and inspiration. We wish it all success and commend it to interested readers.

INCOME TAX IN RELATION TO ACCOUNTS. Published by Thacker & Co., Ltd., Bombay. Pages 234, price Rs. 12-8.

This book will in no time gain a wide popularity in as much as it elucididates in a simple and intelligible manner the intricate aspects of Income Tax. It will be particularly useful to manufacturers, businessmen, lawyers and may serve them in six different ways. The book will show them how to make returns of their income, how they should be assessed to income tax, how much income tax should be paid by them, what rebates and allowances they can claim and how and where to make application for refund of Income Tax and where and how to claim refund of Income Tax. These are all informations which are indispensable from the standpoint of both the tax practitioner and the tax-payer. Chapter I deals with general principles of Income tax. Chapters II & III deal with Assessment Proceedings and Apellate Proceedings. These two Chapters are especially important in as much as they deal with two important aspects of assessment. Of the remaining chapters those on "Refund of Income Tax", and "Super Tax" merit our close attention.

To facilitate quick and easy understanding the author has taken care to explain and simplify matters by means of copious illustrations. At the same time particular care has been taken to bring the book up-to-date, by incorporation of the latest amendments and inclusion of fresh illustrations relating to Hindu Undivided family, temporary residents, deceased persons, and change in ownership constitution of business etc.

One of the most attractive features of the book is incorporation of important High Court cases on Income Tax law.

The book serves many useful purposes. We commend it to our readers.

NOTICES & REVIEW

(Manufacturers sending specimens samples of their products for notice and re[...] may please note that no notice is publishe[d] medical preparations and allied substances this section.)

LOTUS HONEY.

We are glad to receive two sample p[...] of lotus honey from Paulsons, Kabir Lane, [...]yaganj, Delhi.

RUBBER BALLOONS.

We are glad to receive from Goenka Ru[...] Works, Cotton Market, Nagpur, Samples of [...]ber balloons of various sizes and colours, w[...] are found to be good.

PENHOLDERS.

We have received from Prakash Indust[...] 3-3, Maharshi Debendra Road, Calcutta several assorted samples of penholders artistic design.

SILVER RELIEF PICTURES.

We have the pleasure to receive from Mysore Supplies, Post Box No. 6, My[...] silver relief pictures of Luxmi and G[...] krishna, which are found to be very arti[...] We congratulate the manufacturers for ta[...] up this new line.

FIREPROOF PHOTO LOCKETS.

We have the pleasure to receive f[...] Kateja Sonamarts Fireproof Photo Prod[...] Opp. Ganga Mataji-ka-Mandir, Gopaljika R[...] Jaipur, Rajputana two fireproof photo locke[...] Mahatma Gandhi and Pt. Nehru. The mak[...] and finish of these lockets are very nice. [...] wish the concern every success.

TRADE ENQUIRIES

(To communicate with any party writ[e] him direct with name and address given b[y] mentioning Industry).

3378 Prem Dass Tanner, Dehra Dun R[...] Pathanpura, Saharanpur—Wants to be pu[t in] touch with the dealers in blood.

3399 Bishanlall Govil, C/o. Harpar[...] Bhagwandass, Ex. Rationing Shop, Gandhina[...] Kanpur—Wants to be put in touch with dealers in second hand woolen clothes in B[...]bay and Calcutta.

3416 Dalchheram P. Gangwal, Ra[...] Deesa, North Gujrat—Wants to be put in t[ouch] with the dealers in Sakkur seeds in Sind anywhere else.

3424 T. K. Sil, Ramlal Bose Lane, Ra[...]nagar, Burdwan—Wants to be put in touch [...] the suppliers of plastic hand rolls in diffe[rent] sizes and colours.

3520 A.R.M., Junaid & Sons, Old M[...] Street, Colombo 12—Want services of an ex[...] who can install machines for refining and odorising coconut oil.

3539 Sewing Machinery House, 26th B. [...] Mandalay—Wants to be put in touch with manufacturers of Eye brand sewing mac[hine] spare parts.

Torches Bulbs.

China Torches Superior Quality Brass N. P. Body.

(Price per doz.)

	100	200	300	400	700	1500 ft.
Parrot	15/-	27/-	36/-	45/-	55/-	72/-
Lion	—	27/-	36/-	48/-	58/-	78/-
Crop	—	24/-	36/-	48/-	58/-	78/-
Senate	—	—	—	40/-	50/-	—
Steam Ship	—	—	—	54/-	—	—
Merry	—	24/-	—	—	—	—
Wing Wheel	12/-	21/-	—	72/-	84/-	—
Wing Wheel	150	250	260	350	—	—
	15/-	30/-	30/-	45/-	—	—
Wing Wheel Gold	—	—	36/-	60/-	—	—

China Torches all Nickleplated Body :—Britelite & Cheong Brand

100 ft.	200 ft.	350 ft.	400 ft.	700 ft.
10/-	13/8	27/-	36/-	39/- per doz.

China Torches tops & bottom black :— Miscellaneous Brand (Which ever in Stock)

100 ft.	200 ft.
7/8	10/8 per doz.

Bulbs.

U. S. A. Bulbs	54/-	grs.
China Bulbs 2.5 and 3.8 Volts	6/4	100 p.c.
China Bulbs 6.2 Volts	8/-	"
China Bulbs Frosted 6.2 Volts for Cycle Lamps	15/-	"
Colour Bulbs 2.5 and 3.8 Volts	20/-	"
Radio Pannel Bulbs 6.2 Volts	20/-	"
Half Opal Bulbs 2.5 Volts	15/-	100
Solid Bulbs 3.5 Volts	15/-	100

Stationery Goods.

American Blades	2/8	per 100
Stones (Fints) 5 m.m. Size	3/8	per grs.
Cigar Lighters British Make	8/-	per each
Lead pencils U.S.A. Rubber tipped	18/-	per grs.
Lead pencils U.S.A.	12/-	"
Lead pencils Chinese make	9/-	"

Miscellaneous.

Cycle Dynamo complete with Tail Light, "Make-A-Lite" U.S.A. Make	15/-	per each.
Cycle Lamps English, Black Enamelled	30/-	doz.
Gramophone Needles Twin	5/-	1000
Gramophone Needles Regal Eng.	4/-	"
Cycle Lamps Lion Brand taking 2 cells 950 size	36/-	doz.

Electric Accessories.

English Accessories.

([illegible] doz.)

Switches with Porcelain Base 5 Amp.	[illegible]	per doz.
Switches all Bakelite 5 Amp.	15/8	"
Pear Switches	15/-	"
Bed " (Through type)	12/-	"
Holders Pendent	9/-	"
" ½ inch bracket	12/-	"
" Baten	12/-	"
" Angle type Adjusto	18/-	"
" For Screw Cap Lamp	21/-	"
Miniature Batten Holders Bakelite	15/-	"
Push Bar Holders	24/-	"
2 Way holders	12/-	"
2 " " with switch	24/-	"
Wall Plugs complete	15/-	"
3 Pin Wall Plugs complete 5 Amp.	36/-	"
3 " " " " 15 "	72/-	"
Plug Adaptors combined	12/-	"
Plug Pins Clix	8/12	"
Adaptors	8/-	"
Iron Connectors	4/8	"
Cut Outs	10/8	"
Ceiling Roses	7/8	"
Transformers	54/-	"
A.C. Bells	60/-	"
Battery Bells	48/-	"
Bell Pushes	7/8	"
Multiple Plugs 3 way	13/8	"
Male and Female Plugs	9/-	"
House Service Meters 2½., 5 & 10 Amp. D.C.	100/-	each.
House Service Meters 2½., 5 & 10 Amp. A.C.	50/-	"
A.C. Fans 10 inches 'LIMIT'	60/-	"
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Wanted Merchants & Agents for Toilet-goods, Bengal Hair oil, Hill snow, Pomade etc., in India & Colonies. H. K. Mehrotra & Sons, Cawnpore. 362 AA

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K. N. BANERJEE.

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TECHNICAL EDUCATION AND ECONOMIC PROGRESS.

TECHNICAL education and economic progress are intimately correlated. And in an ideally balanced development both should proceed forward together, each being stimulated in turn by the other. When one lags, it receives a stimulus from the other and vice versa.

Considering this fundamental fact, we, in India will have to evolve the easiest and speediest means of spread of technical education all over the country as also of quickening the process of a thorough Indianisation in all our industrial undertakings. After all, we have to set our own house in order. Consequently it will not do for us to rely on foreign technical aid for an indefinite period of time.

To achieve that purpose, the best method will be conversion of some of the existing institutions into agricultural, technical and commercial institutions with a view to providing alternative vocational education to those having no aptitude for higher literary studies. Besides a syllabus of technical instruction, should be incorporated in school curriculum so as to develop a technical outlook from the very boyhood. The measures will, we believe, in the long run, not only provide stimulus to our agricultural and industrial production but in a large measure solve the unemployment problem which is a growing menace to social stability and security. The cardinal principle in our future educational scheme should be to popularise and democratise technical education, affording all possible facilities to juvenile aspirants.

Technical education, in the present system, is an extremely costly affair. And the greatest tragedy of our national life is wastage and dissipation of promising talents, who are debarred from facilities of technical training mainly on financial grounds. We should try our level best to avert the same dismal tragedy.

To speed up the affair, foreign technical assistance will be indispensable, time factor being of great importance. Particularly their service as instructors will be inestimable. We urge our Government to set up a central training institute under the supervision of these foreign instructors to train up Indians in their nation-building task.

Current Topics

PROTECTION GRANTED TO BATTERY INDUSTRY.

Battery industry's claim for protection so long remained unquestioned and should continue to be so from considerations of its vast possibilities and its vital and strategic importance. It is during World War II that the industry received its first stimulus and since then it has made a remarkable progress.

This progress, we hope, will go on unhindred because it will have a constant and steady market in the Defence Forces of Government of India. As a matter of fact, with the reorganisation of Indian Army, this product will form one of the indispensable elements of our army-equipment. Thus with the prospect of a steady and considerable demand for this commodity—this industry may be said to have a very bright future indeed.

Not to speak of the Defence Forces alone, this Industry is bound to have a considerable demand for its products when our automobile manufacturing industry begins turning out its products in large numbers. Thus we can safely predict that this demand for batteries both wet and dry, must increase in the years to come.

It is, therefore, gratifying to learn that Government of India has agreed on the recommendation of the Tariff Board, to grant tariff protection to the industries. It will not be out of place to mention here that Government have already granted protection to dry battery industry. As a natural sequel has followed Protection to wet battery industry. It is therefore reasonably hoped that under the protecting wings of the Government, both these industries will grow from more to more in the years to come.

In addition to this protective tariff Government have agreed to afford all sible facilities for expansion of this dustry by granting import licenses battery-making plant and securin steady flow of raw materials required.

The industry, it is obvious, satisfies of the primary conditions of protectio as much as most of the raw mate necessary for its manufacture, are a able here in India. The main raw mate necessary for its manufacture, may stated as follows:—rubber or asbe certain chemicals or plastics, lead, antimony, lead oxides, cedar w sulphuric acid and sealing comp made from bitumen. With the ception of lead and suitable wood separators and certain chemicals, mo these raw materials are to be founc India.

In recommending protection for industry, the Board has been influe by the consideration that given a st flow of raw materials, the industry bound to grow in proportion.

The dealers, it is obvious, hav partiality for imported batteries. Board have taken this into account have assessed partiality for imported teries at 20 per cent. of the retail se price of batteries.

According to the estimates of T Board, the present demand for m vehicles batteries in the country is 250 a year, while the estimated rated cap of the industry is 268,300 batteries 1948, and 352,300 for 1949. Obvio if battery industry works up to its capacity, it may easily meet our dom

requirements and there would be practically no need of imports in near future.

Further recommendation of the Board, which this industry should take particular note of, relates to the quality of output. The Board has recommended that the industry should take all possible steps to evolve a specification for batteries as well as containers and also recommends that the Council of Scientific and Industrial Research should take steps to have the materials procured for the manufacture of containers.

Experiments should also be undertaken, the Board says, at the Dehra Dun Forest Research Institute with varieties of wood. It also recommends that the Government should give all facitities for the procurement of raw materials improved as well as indigenous. It is thus clear that the progress of the industry will depend a great deal on the joint and collective effort of the Forest Research Institute, the Scientific and Industrial Research and the Government.

INDO-YUGOSLAV TRADE.

A trade agreement between the representatives of the Government of India and the representatives of federal People's Republic of Yugoslavia has been signed in Calcutta. According to the agreement, both countries agree to an exchange not only such commodities as are surplus to their economy but also those which can be exported at some sacrifice. The underlying idea is to help each other's economy.

An eight-man trade delegation from Yugoslavia arrived in Delhi last December and has been in constant conference with officers of various Ministers concerned under the auspices of Ministry of Commerce. As a result an agreement has been reached which is regarded as satisfactory and mutually advantageous. The agreement, subject to ratification by both Governments, will come into force early in January.

The schedules which specify commodities intended for exchange are to be reviewed from year to year in the light of the general covering clauses. Payment for goods will at present be in sterling, but it is hoped that arrangement will be made in the near future for making payments either in Indian or in Yugoslav currency for both.

Under the agreement Yugoslavia will make export allocation of maize, calcium carbide, tea-chests, newsprint, plywood cement, asbestos cement, among other commodities. India, on her part, will make export allocations of cotton, cotton textiles, jute products, tea, coffee, pepper, spices and certain medicinal herbs and plants. Dr. Mirko Mermoja, leader of the Yugoslav delegation, signed the agreement on behalf of his country while Mr. C. C. Desai, Commerce Secretary signed on behalf of India.

An agreement between India and Yugoslavia was long over due. The small indirect trade which had formerly existed between these two countries was interrupted during the last Great War. We strongly feel that there should be full revival of these trade connections. So it is to our immeasurable satisfaction that we find it at last finalised. The agreement will be conducive to interest of both India and Yugoslavia.

INDO-PAKISTAN AGREEMENT.

Agreement talks in New Delhi have reached a happy conclusion. And the problems that figured prominently in New Delhi Conference mainly relate to 'Minorities', Refugee, passengers and goods traffic and promotion of commerce and trade between the sister dominions. It appears from the latest announcement of Government of India that concrete results

have emerged out of their deliberations. They have agreed in fundamentals and have decided to set up suitable machinery to implement their decisions. They have agreed to set up a minority Board, as well as an Inter-dominion Information Consultative Committee to look after and safeguard the interests of Minorities in both the dominions. Besides, in regard to Boundary disputes, both the Governments have agreed to abide by the decision of Judicial Tribunal, to be set up shortly.

Settlement with regard to the above questions is long overdue. Any unnecessary delay in the solution of these urgent problems will be highly undesirable and detrimental to the interests of both the dominions. We are relieved to find that settlement talks in New Delhi have not been allowed to founder on the rock of Kashmere issue.

The considerations that particularly seem to weigh with these Governments and have contributed to progress of peace talks are not only humanitarian but also commercial to a considerable extent. As a matter of fact, on the peaceful settlement of these problems depends a happy collaboration between Pakistan and India. India and Pakistan will have to come closer by sheer stress of necessity.

INDUSTRIAL POLICY OF THE GOVERNMENT.

Prof. M. K. Ghosh in his Presidential address at the Annual Commerce Conference made a comprehensive survey of the various economic problems that confronts India to-day. The privotial question round which his survey mainly centres is the declining production of the country. The President is of opinion that the production in all sectors has been undermined due to uncertain industrial policy of Government of India. He thinks that the implication of industrial policy has given rise to a psychological situation most unfavourable to free and private enterprise and he is therefore of opini[on] that industrial policy has to [be] substantially altered to provide an [in]centive to free and private enterpr[ise] in the country. Ghosh's proposition is pa[r]tially true. With a clear insight, he h[as] analysed main causes of industrial decli[ne]. But at the same time we think that Gover[n]ment's repeated assurances on this vi[tal] issue leaves no grounds for fear or susp[i]cions. An ample scope still remains in t[he] sphere of private enterprises. Any su[b]stantial alteration in Government's indu[s]trial policy seems to be unnecessary.

The recent pronouncements of cabi[net] ministers are highly encouraging and [re]assuring and will help to create the prop[er] and congenial psychological situation [for] the commercial community of India.

INDO-U.S. TRADE.

Mr. Henderson, the American Amba[s]sader in India, in a recent Press Confe[r]ence, indicated the lines in which In[dia] might get assistance from the Unit[ed] States. He gave definite assurance tha[t it] was the basic policy of United States [to] aid India in so far as it was possible, qu[ickly and] effectively with such resources as it h[ad] for the economic development. The e[x]tent to which they could help India [de]pended firstly, on how much the Unit[ed] States had, secondly, on what India wa[nt]ed and thirdly, to what extent such h[elp] would be effective in promoting produ[c]tion and prosperity.

These are the ways in which it m[ay] be possible for America to help India su[b]stantially and materially.

Firstly there was the Internatio[nal] Bank, which seemed to him the most lo[gi]cal approach. If India was interested [in] obtaining loans from the Internatio[nal] Bank and told the Bank what the loa[ns] were intended for and if the Bank appr

ed of the plans, she would extend loans to India.

A second source of possible assistance was the United States Export and Import Bank, which was an American institution. Nevertheless it was used for facilitating foreign trade and promoting specific projects of extreme consequence for Government trade. It was quite possible that some propositions might be made from India which would meet with the requirements of the Import Export Bank and loans would be made.

A third source was aid by special acts of the congress, but this, Mr. Henderson pointed out, was made only in extremely exceptional circumstances. And he did not think any emergency situation existed to warrant special congressional aid.

India Government, may easily avail themselves of all these sources of help and assistance for her postwar reconstruction and development. These definite assurances from the American ambassador will go a long way to pave the way for mutual collaboration and co-operation in the sphere of trade and commerce between India and America.

MANUFACTURE OF TRACTORS IN INDIA.

It is gathered from authoritative sources that India Government have decided up to set up a factory for manufacture of tractors in this country. The project will cost 2 crores in all. We come to learn that even in the first year of its birth, the factory will produce 7 thousand tractors. The total imports of tractors in this country amount to nearly 4,000. Every tractor costs 7½ thousand to 9 thousand. It is gathered that India-made tractor will be nearly half the present price of imported tractors.

This decision of Government of India is a welcome step in as much as it is mainly on wider use and application of this scientific implements that increased production in the sector of agriculture depends. Installation of factories for manufacture of this useful implements will naturally lead to their wide application and thus to an intensive production which is really pressing need of the hour.

BRITISH PLASTICS MACHINERY FOR INDIA.

India has received a sympathetic response from a British Manufacturing Company as regards its machinery requirements for plastic manufacturing factory to be shortly set up in Bangalore. The finished machinery which consists of 18 extrudes (the machines used in the commercial production of extended plastic products) and other allied equipment was specially designed in one of Britain's most up-to-date plastic factories.

Two young Bangalore scientists, Mr. H. S. Visweswariah and Mr. P. S. Srinivash Mudaliar, who will help in the erection of the plant, have now returned to India after completing a three-month training period at the Bukshire factory. Indian students should be sent abroad in larger numbers for technical training in these industrially advanced countries. It has been proved beyond doubt that Indian genius are equally capable of grasping the technicalities of modern industry.

It has been decided that when the plant arrives at Bangalore and is ready to be installed, three experts from the British factory will supervise the work. They are Mr. E. T. Garduer, Mr. Arthur Pelliag who are tool room foreman, extruder shop foreman and laboratory technician respectively.

The plant consists of four three-inch, six two-inch and eight one-and-a-quarter inch extruders with wire covering and

cable equipment, conveyor and take-of mechanism, extruder dies and nozzles in fact, complete equipment for a factory down to the smallest detail.

At the outset we shall have to surely depend on foreign technical equipment and technical personel for our different industries in India. And it is gratifying to note that British firms in this particular case have promptly responded for active co-operation and assistance.

PRIORITY COMMITTEE.

As an anti-inflationary measure, the Government set up a Priority Committee for curtailment of Governmental expenditure. The main object of the Committee was to select and winnow out the items of comparatively vital importance. In the current year, ending March, 1949, the Budgeted expenditure amounts to 70 cores. The Priority Committee, after a close examination of the various items, have proposed a reduction upto 51 crores. The allocated expenditure for installation of Telephone Apparatus will, however, remain unaffected. And the Budgeted Railway expenditure, too, will remain unaltered. In the coming year Government will allot 45 crores for general development and six crores for expansion of shipping companies and several industries.

Government expenditure, we are aware, may be one of the major contributory factors to inflation, unless discrimination is exercised in regard to allocation of expenditure under different items . So, we wholeheartedly endorse this laudable move on the part of the Government.

METAL POLISHES & THEIR MANUFACTURE

IN recent years revolutionary change has been effected in the preparations used for cleaning brass and other metals common in the household. In former times oxalic acid and rottenstone were the universal metal polishing agents. First of the new preparations, in point of time and popularity, came the soaps of Brooke's type, which is essentially a mixture of a fossil earth or fine silica and soap, the latter in small proportion. The chief secret about these soap preparations is the source of the pulverulent materials which make up their bulk. Next came the polishing pastes, in which ferric oxide and petroleum jelly are the main ingredents, and thus paved the way to quite a unique group of preparations which revealed to housewives the startling efficiency of paraffin as a metal-cleaning material.

It is well to note that most metals used in the household become dull either with the adhesion of greasy matter or by the oxidation of the metal. The old-fashioned way for restoring the bright surface was simply to rub off the dull part; but the new preparations aim at dissolving the grease and oxide, thus enabling the polishing basis to work more easily and quickly.

The essential feature of any metal polish is its abrasive action. As these should be applied almost frequently, the materials used must be very cheap. The detergent most commonly employed is paraffin, as this readily removes grease and dirt associated with it. In some polishes a little ammonia or a little soap is added, or one of the numerous synthetic solvents is substituted for the paraffin. The sole purpose of the detergent is to loosen and dissolve the adherent dirt, and it does not in itself, produce a polish. The abrasive most generally employed is some form of very finely divided silica or a siliceous rock, such as kieselguhr or pumice. The particles must be "dust-fine" and highly angular, or they will not do their work properly without serious scratching. In this latter respect the presence of a little soap is often an advantage, as it enables the abrasive to remain longer in suspension and minimises its scratching, as distinct from its polishing effect. The proportions of the various ingredients scarcely matter. There must be sufficient liquid to enable the polish to be applied readily; the quantity of detergent is unimportant so long as enough is present to clean the surface. The main ingredient is the abrasive and this may constitute two-thirds of the mixture.

LIQUID POLISH.

I

Solvent naphtha	62 oz.
Oleic acid	½ oz.
Kieselguhr	7 oz.
Triethanolamine	½ oz.
Ammonia Fort	1 oz.
Water	1 gal.

In one container mix together the naphtha and oleic acid to a clear solution. Dissolve the triethanolamine in water separately, stir in the abrasive and then add the naphtha solution. Stir the resulting mixture at a high speed until a uniform creamy emulsion results. Then add the ammonia and mix well, but do not agitate as vigorously as before.

II.

Ammonium linoleate	20 parts.
Oxalic acid	2 ,,
Ammonia	4 ,,
Water	150 ,,
Naphtha	10 ,,
Silica	60 ,,
Industrial spirit	5 ,,

Heat the water to 70°C. Dissolve the oxalic acid, add the silica and stir until dispersed. Add the ammonia and stir for a few minutes keeping at 70°C. Then add the ammonium linoleate and stir until dissolved. Add the naphtha slowly and stir. The mixture becomes very heavy. The alcohol is then added slowly until the desired body and viscosity are obtained.

III.

Ammonium linoleate	20 parts.
Naphtha	100 ,,
Silica	40 ,,
Ammonia	2 ,,
Alcohol	2 ,,

Heat the naphtha cautiously to 60°C. Dissolve the ammonium linoleate and disperse the silica. Add the ammonia when the mixture becomes very heavy. It is then thinned down as desired in the addition of the alcohol.

POLISHING PASTE.

I.

White petroleum jelly	90 parts.
Kieselguhr	30 ,,
Paraffin wax	10 ,,
Prepared chalk	10 ,,
Sodium hyposulphite	8 ,,

Melt the wax and petroleum jelly, stir in the other ingredients and grind until almost solidified. Then pour in tins.

II.

Turpentine oil	2 parts.
Emery flour	2 ,,
Paris red	4 ,,
Vaseline	4 ,,

Mix well.

III.

(a)	Paraffin wax	5 parts.
	Stearic acid	16 ,,
	Oleic acid	29 ,,
(b)	Whiting	20 ,,
	Magnesium carbonate	30 ,,

Melt up (a), and work in the well sifted (b).

POLISHING CLOTH.

Cloths used for polishing vary only slightly in their treatment. There are two classes—those which depend upon some abrasive mechanically held on the fibre, and those which have an acid such as oxalic as their effective agent. The abrasive cloths can be prepared in many ways, by the use of a wax to hold the abrasive which requires mechanical manipulation to apply, and by the use of a volatile solvent with a fixed oil or fatty acid to fix the abrasive in the fibre. Cloths dipped in the following suspension will give satisfactory results:

Formula No. 1.

Benzine	500 c.c.
Whiting	200 g.
Infusorial Earth	50 g.
Oleic Acid	3 g.

The mixture should be kept in constant agitation; the cloths are dipped, slightly wrung out, and allowed to dry in a place remote from fire. The whiting or infusorial earth may be replaced by white bole or jeweller's rouge if desired.

Canton flannel is the usual fabric employed and it is cut about 18 × 24 or 18 × 36 inches in size. The cloth may be bound or left unbound. The fabric is immersed in the polish solution and the excess squeezed out by passing through an ordinary cloth wringer with the rolls set quite tight. An alternative method is to suspend fabric in a spray booth and spray with a spray gun containing the polish.

Formula No. 2.

The polishing liquid may be straight oleic acid suitably scented. Sometimes petroleum or stearic acid, or both, are dissolved in it to the extent of 5 to 10% to render it less oily. The oleic acid may be

placed in whole or in part with paraffin To facilitate absorption and reduce final oil content it may be thinned with volatile solvent allowing the cloth to before packaging.

POLISHING CLOTH.

(a)	Hard Soap	5	parts.
	Boiling water	35	„
	Glycerine	5	„
(b)	Oleic acid	7	parts.
	Tripoli powder	35	„
(c)	Ammonia (0.96)	5	„
(d)	Denatured Spirit	8	„

Heat solution (a), add (b), saponify h (c). Cool 40°-45°C and add (d).

Impregnate at 45°C, dry the cloth, st out gently, and pack.

POLISHING CAKE.

Montax wax	30	parts.
Chromium oxide	70	„

Melt together and stir until cool.

POLISHING SOAP.

I.

Saponified coconut oil	56	pounds.
Kieselguhr	12	„
Alum	5½	„
Flake white	5½	„
Tartaric acid	1½	„

II.

Tallow soap	98	pounds.
Liquid glycerine soap	14	„
Whiting	18	„
Levigated flint	14	„
Powdered pipe clay	14	„

POLISHING POWDER.

Polishing powders are advantageous- prepared according to the following ipes

1. 4 pounds magnesium carbonate, 4 pounds chalk, and 4 pounds rouge are intimately mixed.
2. 4 pounds magnesium carbonate are mixed with ½ pound fine rouge.
3. 5 pounds fine levigated whiting and 2 pounds Venetian red are ground together.
4.

Kieselguhr	42	pounds.
Putty powder	14	„
Pipe clay	14	„
Tartaric acid	1½	„

Powder the acid, mix well with the others. This is styled "free from mercury, poisonous mineral acids, alkalies, or grit". It may be tinted with 12 pounds of oxide of iron if desired.

POLISHING STICK.

Double Pressed Saponified stearic Acid	30	parts.
Edible Tallow	25	„
Paraffin Wax	25	„
Tripoli Flour	20	„

(or as much as will be absorbed).

Melt and mix the Tripoli powder. Then pour in moulds.

A buffing or polishing paste may be made, using the above formula, with the addition of a small amount of turpentine and of water to bring to the consistency desired.

INDUSTRY PRIZE COMPETITION, 1948.

RESULTS OF THE INDUSTRY PRIZE COMPETITION, 1948 WILL BE DECLARED IN MARCH 1949 ISSUE. TERMS AND CONDITIONS FOR THE *INDUSTRY* PRIZE COMPETITION, 1949 WILL BE ANNOUNCED IN APRIL 1949 ISSUE.

PREPARATION OF MEDICATED EMULSIONS

EMULSIONS are opaque liquid preparations of a thick consistence, in which oily or resinous liquids are suspended by the agency of gummy or viscid substances. The preparation of these pharmaceutical products, whether of fixed or volatile oils, is generally most satisfactorily and expeditiously accomplished with acacia as the emulsifying agent. Preference is therefore given to acacia in this article, though other emulsifying agents are not ignored, and their use and application are exemplified in a number of alternative formulas for preparing emulsions.

When acacia is used as the emulsifying agent it is essential that the oil, the acacia and the water shall primarily be in definite proportions to each other. This acacia, and two parts of water (liquids by measure, solids by weight). The oil, and the acacia in fine powder, are well mixed by *trituration in a perfectly dry mortar;* the water is then added in one portion, and the whole is triturated briskly until a thick, creamy emulsion is produced; the sides of the mortar should be carefully scraped, and the mixture again thoroughly triturated so as to insure complete emulsification of the oil. The other ingredients may then be gradually added; first the flavouring, then the syrup and the water necessary to make the final quantity.

Alcoholic liquids are added last, and must be mixed previolsly with a portion of the water.

To prevent the separation of an aqueous layer a small quantity of tragacanth may be added during the process of manufacture.

With some other emulsifying agents, such as mucilage of chondrus and glycerite of yolk of egg, it will suffice to place the agent in a bottle or mortar, and to add the oil in small portions at a time, shaking or triturating briskly after each addition until emulsification is complete.

The preparation of emulsions is much facilitated by the use of mechanical contrivances that can be employed when emulsions are made in large quantities.

Emulsions under ordinary conditions are prove to deteriorate on standing, and it is recommended that they be freshly prepared when needed. Stock emulsions must be suitably preserved and kept in a cool and dark place.

FLAVOURING.

No single or compound aromatic can be suggested which would be acceptable under all circumstances as a flavouring for emulsions of cod liver oil. The selection of the most aromatic must be left to the prescriber or dispenser. Among those which are found to be most serviceable are the following, the quantities given below being intended for 1000 c.c. of finished product:

No.	Ingredient	Quantity	Unit
1.	Oil of goultheria	4	c.c
2.	Oil of goultheria	2	,,
	Oil of Sassafras	2	,,
3.	Compound spirit of orange	1.5	,,
4.	Oil of goultheria	2	,,
	Oil of bitter almond	0.25	,,
	Oil of coriander	0.25	,,
5.	Oil of goultheria	1.50	,,
	Oil of sassafras	1.50	,,
	Oil of bitter almond	0.25	,,
6.	Oil of goultheria	2.5	,,
	Oil of bitter almond	2.5	,,

EMULSION OF COD LIVER OIL WITH HYPOPHOSPHITES.

Ingredient	Quantity	Unit
Cod liver oil	500	c.c.
Acacia, in fine powder	125	grms.
Calcium hypophosphite	10	,,
Potassium hypophosphite	5	,,

Syrup	100 c.c.
Flavouring	q.s.
Distilled water sufficient to make	1000 c.c.

Triturate the gum acacia with the cod [liver] oil in a dry mortar until uniformly [mix]ed, then add at once 250 c.c. of distil[led] water and triturate lightly and rapidly [unti]l the oil is completely emulsified; add flavouring and incorporate thoroughly. [Diss]olve the hypophosphites in 100 c.c. of [disti]lled water, mix the solution with the [syru]p, and add this liquid gradually to the [emu]lsion and continue trituration. Final[ly a]dd sufficient distilled water to make [the] product measure 1000 c.c. and mix [thor]oughly.

Average Dose: 8 c.c. or 2 fl. drachm.

[EMU]LSION OF COD LIVER OIL WITH MALT.

Cod Liver Oil	300 c.c.
Tragacanth, in fine powder	3 grms.
Distilled water	150 c.c.
Extract of malt, a sufficient quantity to make	1000 ,,

Mix the oil and the tragacanth [thor]oughly in a bottle, add the water and [shak]e the mixture until a homogeneous [susp]ension is formed, finally add the [extra]ct of malt in portions, shaking the [mixt]ure thoroughly after each addition. [Until] the product measures 1000 c.c.

Average Dose: 15 c.c. or 4 fl. dr.

[EMU]LSION OF COD LIVER OIL WITH EGG.

Cod Liver Oil	500 c.c.
Glycerite of yolk of egg	175 ,,
Syrup of tolu	100 ,,
Alcohol	129 ,,
Flavouring	as desired
Distilled water, a sufficient to make	1000 c.c.

Triturate the glycerite of yolk of egg [in a] mortar with the oil, added in small [porti]ons at a time, and thoroughly emul[sify] each portion before adding the next. Then, continuing the trituration, gradually add the syrup of tolu, then the alcohol and the flavouring, and sufficient water to make the product measure 1000 c.c. Mix thoroughly.

Average Dose:—15 c.c. or 4 fl. dr.

EMULSION OF CASTOR OIL.

Castor oil	35.0 c.c.
Acacia, in fine powder	90 grms.
Tincture of vanilla	2.5 c.c.
Syrup	20.0 ,,
Distilled water to make	100 ,,

Triturate the acacia with the castor oil in a dry mortar, until uniformly mixed, then add 18 c.c. of distilled water and triturate lightly and rapidly until the oil is completely emulsified. Gradually incorporate the syrup and tincture, and finally add sufficient water to make the product measure 100 c.c. Mix thoroughly.

Average Dose:—45 c.c. or 1½ fl. oz.

EMULSION OF OLIVE OIL (B.P.).

Olive oil	10 fl.oz.
Acacia, in fine powder	2½ oz.
Tragacanth, in fine powder	60 gr.
Elexir of saccharin	20 mins.
Tincture of benzoin	100 ,,
Chloroform	20 ,,
Oil of bitter almond without hydrocyanic acid	10 ,,
Distilled water to make	20 fl. oz.

Triturate quickly the olive oil with the acacia and tragacanth; without delay add in one quantity 5 fl. oz. of distilled water and stir briskly until emulsified. Add the other ingredients and sufficient distilled water to produce the required volume.

Dose:—½ to 1 fl. oz.

EMULSION OF LIQUID PARAFFIN WITH AGAR (B.P.).

Liquid Paraffin	10 fl.oz.
Agar	66 gr.

Acacia, in powder	½	oz.
Tragacanth, in powder	22	gr.
Benzoic acid	15	„
Vanillin, in powder	4½	„
Oil of lemon	10	mins.
Glycerine	1	fl.oz.
Distilled water sufficient to make	20	„

Add the agar to 8 fl.oz. of the distilled water and boil gently until dissolved; if necessary, replace the water lost by evaporation, then dissolve the benzoic acid in in the mucilage and strain while hot. Warm the liquid paraffin and triturate it with the acacia, tragacanth and vanillin previously mixed; without delay add the strained mucilage in one quantity while hot and stir briskly until cold. Then add the glycerine, oil of lemon and sufficient distilled water to produce the required volume.

Dose:—1 to 4 fl.dr.

EMULSION OF LIQUID PARAFFIN WITH KAOLIN (B.P.).

Liquid paraffin	5	fl.oz.
Acacia, in powder	300	gr.
Tragacanth, in powder	37½	„
Kaolin	3½	oz.
Chloroform water to produce	20	fl.oz.

Triturate quickly the liquid paraffin with the acacia and tragacanth; without delay add 2½ fl.oz. of chloroform water and stir briskly until emulsified. Gradually add a suspension of the kaolin in 10 fl.oz. of chloroform water and sufficient chloroform water to produce the required volume.

Dose:—½ to 2 fl.oz.

EMULSION OF PETROLATUM.

Petrolatum	225	grms.
Expressed oil of almond	225	c.c.
Acacia, in fine powder	125	grms.
Syrup	100	c.c.
Tincture of lemon peel	15	„
Distilled water to make	1000	„

Triturate the melted petrolatum w the expressed oil of almond in a warm d mortar, add the acacia and triturate un it is uniformly mixed. Then add 250 c of warm distilled water and tritur lightly and rapidly until the oil is co pletely emulsified. Now add the syr and the tincture, previously mixed, a sufficient water to make the prod measure 1000 c.c. Mix thoroughly.

Average Dose:—15 c.c. or 4 fl.dr

PRESERVATION OF EMULSION.

While the emulsions are supposed be extemporaneous preparations, it often necessary to make stock prepar tions in which decomposition will n occur. For this purpose the flavouri oils are often helpful, especially meth salicylate, but it is usually desirable to a a preservative like sodium benzoate, on tenth of one per cent or 8 to 10 per ce of alcohol. The latter not only preserv the emulsion but helps to maintain a flu consistence. Alcohol should be add last and in small portions, shaking t emulsion after each addition.

MANUFACTURE OF SHUTTLECOCKS.

THE popularity of playing badminto is gaining ground in all countri This game is played with rackets a shuttlecocks which are generally made duck's feather. The making of the shuttlecocks are easy and can be carri out with inexpensive tools such, as sc sors, perforating machine, hammers, e with a small capital and the manufactu of these shuttlecocks can be undertak as a cottage industry.

There are two kinds of badmint balls. One kind is composed of duck fe

thers artistically arranged and fixed on a piece of cork, known as shuttlecocks while the other is made of Berlin wool usually of yellow colour. Let us deal both the balls one after another.

SHUTTLECOCKS.

In making shuttlecocks the duck's feather particularly the white ones are selected but for cheaper types coloured feathers are generally employed.

The corks of 1 inch in diameter are to be selected. These are next cut to required size say 1 inch in length and their bottoms are rounded up and cut to required size. Sometimes cylindrical corks are used.

CLEANING THE FEATHER.

The feather as purchased from the market are contaminated with too much dust and dirt. To remove these foreign matters adhered these are immersed in cold neutral soap solution for 12 hours which dissolves out the dirt and dust from the surface of the feather. After this the feathers are washed with clean water and scattered over a mat or blanket exposed to the sun. When the feathers are partially moist a few pinches of refined china clay or bentonite or talc is scattered over them, which are then shaken to and fro for a few minutes whereby the china clay may distribute evenly over the feathers making them more white on drying.

Another method of cleaning the feathers is as follows:—

To cleanse feathers take for every gallon of clean water 1 lb. of quicklime, mix them well together, and when the undissolved lime is precipitated in a fine powder pour off the clear lime water for use. Put the feathers to be cleansed in another tub and add to them a quantity of the clear lime water sufficient to cover the feathers about 3 inches when well immersed and stirred about therein. The feathers when thoroughly moistened will sink down and should remain in the lime water 3 or 4 days, after which the foul liquor is drawn off, the feathers rinsed with clean water, and then dried.

PERFORATING THE CORKS.

The corks with round bottom are the best for making best type of shuttlecocks but for cheaper variety of balls any kind of cylindrical corks of 1 inch diameter may be selected. The lower portion of these cylindrical corks are rounded up by means of a flat filip. The upper portion which is about 1 inch from the bottom surface is next symmetrically perforated are its circumference for the insertion and fixing up of the features. Usually 16 holes are made. For cheaper type a notch may be cut up with a file for the purpose binding the feather bottoms.

CUTTING THE FEATHER.

Cutting the feather to required size is very important. The length may be 3 inches and the softer downs from the lower ½ inch may be removed. Unless the length of the feathers is equal the finished shuttlecocks will not maintain perfect balance when fly from one direction to another by the stroke of racket. For this purpose one well cut feather of 3 inches in length is secured from an old shuttlecock of good quality and then all the feathers are cut to this size by means of a scissors only; the middle portions of feathers are suitable. The bottom portions are rather too thick and the upper ends are too soft and thin.

Now the sample over the cut pieces one by one and a pair of scissors is passed along the boarder of the sample cutting the other feather similar in shape as the sample. In this way all the features are cut to the desired shape and size.

PUNCHING THE LEATHER.

The leather is next cut or punched out in the form of circle a little larger than 1 inch diameter i.e., slightly larger than the top of the cork. A series of 16 perforations are made at the circumference of the leather pieces through which the bottom of the feather is to be inserted. The perforated leather pieces are then adhered to the top of the perforated cork by means of glue in such a way that the holes of the leather as well as the corks are considered together. For cheaper shuttlecocks the top of corks are not bored but are grooved by a flat file so as to act as a support for the feather. The leather piece after attaching to this end of the cork are kept aside to dry in the sun.

LEATHER CAPS.

Next white leather caps, which are to be fitted at the bottom of the rounded corks are punched out from the leather sheet. This is produced by making a groove of 1 inch in diameter and 1 inch deep. A wooden rod is so shaped that it may be fitted tightly into this groove. Now the groove is rubbed up with French chalk and a sheet of leather is placed over the mouth. By means of a hammer the rod is pushed into the die forcing the leather inside taking the shape of a cap. Before withdrawing the rod the leather is cut out by means of a sharp knife. In this way a number of caps are made at a time and kept ready for fitting.

GLUE SOLUTION.

The glue solution suitable for this purpose may be prepared thus:

Take ½ lb. of glue or gelatine and soak it with ½ lb. of water for 24 hours. After this heat it over a small fire so as to form a homogeneous fluid. If the glue is dark a pinch of zinc oxide or bayrytes is stirred in with a rod. This will produce somewhat white paste.

After perforating the corks and the leather, each piece of the leather piece is adhered by means of hot glue to its upper side of the cork in such a way that the holes of the two will coincide with one another. When the leather pieces are thereby applied over the corks, they are kept away for some time to dry up the glue.

Now take the well-cut feathers and after dipping their lower end into hot glue solution fix up into the holes of the leather fitted corks. Put up one feather in one hole in a straight way. In the manner fit up feather over the corks. Allow the feather fitted corks to set and then bind up twines in two rows, one at the base and other at its middle. This will make the feathers strong. Next apply a little glue solution on the twine so as to make it rather stiff. After this put up a white leather cap with some glue and cover and just at the base of the feather with some silk ribbon, blue or red by the application of a little glue. This will make the shuttle cock rather attractive. Lastly the balls are finished by trimming the extreme end of the feathers and keep exposed to the sun and then put in cardboard rolls in the usual way. But before this the shuttlecocks should be weighed for grading viz. match balls, practice, etc.

For cheaper shuttlecocks coloured feathers are generally used and the corks filed out to make its bottom round and notches are made at the upper side for the fixing of feathers. The process is the same as above except the feathers are tied with the cork by means of strong twine and then covered with a band of cloth smeared with glue. After drying the caps are fixed.

WOOLLEN BALLS.

Cut two circles of cardboard of 5 cm. radius and make inner circles of ½ cm. radius with the same centres and cut out the

smaller circles which leave a hole in the large circles. Now place the two big circles one above the other and pass the woollen thread four-fold or eight-fold (of sufficient length) round and round the cardboard strip, thus filling the hole bit by bit. After the hole is pretty well filled take a sharp knife, make a cut on the edge of the circle so as to cut the wool until one can see the cardboard. Then insert the knife between the two cardboards and cut round. Then take a strong twine and inserting it also between the cardboards tie very firmly. The knot should be very tight as the ball will lose shape if tied loosely. Then make it round by cutting with the scissors after removing the cardboard pieces. With 5 oz. of woollen thread 7 balls can be made.

UTILISATION OF COCONUT SHELLS.

IN coconut growing countries like India and Ceylon, there arise millions of coconut shells every year. It seems reasonable to ask what happens to this huge quantity and to consider possibilities for its better economic utilisation. In this connection an interesting article appeared recently by Dr. R. Child, Director, Coconut Research Scheme, Ceylon in The Tropical Agriculturist, an extract of which is appended for the benefit of our readers.

COMPOSITION.

Qualitatively coconut shells are similar in composition to the hard woods, though the lignin content is higher and the cellulose content lower. The following are typical figures:—

Moisture	8.0 per cent.
Ash	0.6 ,, ,,
Solvent extractives—	4.2 ,, ,,
Liquid	29.4 ,, ,,
Pentosans	27.7 ,, ,,
Uronic anhydrides	3.5 per cent
Cellulose	26.6 ,, ,,
Methosyl content	5.6 ,, ,,
Nitrogen	0.11 ,, ,,
	100.0 ,, ,,

USES AS FUEL.

Coconut shells are commonly used a domestic fuel: laundries, bakeries, house holders and the like use fair quantitie But copra drying in Ceylon accounts fc most of the utilisation as fuel. In th usual type of drier, the wet coconut mea containing about 45 per cent of moistur is dried down to copra of 6 or 7 per cer moisture content by the direct heat fro burning rows of coconut shells.

For this purpose dry shells freed fro adhering fibres have the advantage tha they produce a clear-burning fire wit little smoke. A plantation will, using th old type of kiln, use about two-thirds c its shells for copra drying.

The increasing utilization of shells fc industrial purposes and the premiu obtainable for "hot airdried" as again "smoke dried" copra, has led to the intro ductions of patent kilns which use an available fuel such as the usual debris o coconut plantations of fallen fronds, beec stalks, old logs, etc.

CHARCOAL.

In the years immediately precedin World War II, coconut shell charco was in demand for the preparation of ga absorbent carbons.

Formerly charcoal was made by th time honoured process of burning in pi with the exclusion of air. Since 193 however, the kiln distillation of shells ha been carried out on a laboratory an industrial scale.

DISTILLATION PRODUCTS.

Although shells are of a simil chemical nature to wood, there are certa

industries based on wood as a raw material which cannot make use of shells. Thus, paper pulp cannot be produced from shells as the cellulose of the latter is non-fribrous.

One group of industrial products is derived from the distillation of wood viz., acetic acid, wood spirit and creosote; and here from the technical point of view, coconut shells have some advantages over wood.

When the shells are burned in ordinary pits for charcoal they yield rather less than one third of their weight of charcoal. If instead, they are fired in ovens or retorts heated from the outside, and the vapours condensed, there can be obtained from 100 lbs. of shells, besides the charcoal (about 30 lbs.), some 35 to 40 lbs. of pyroligneous acid and about 5 lbs. of settled tar. The acetic acid content of the pyroligneous acid is remarkably high much higher than that from most woods and usually runs over 10 per cent. about 2.5 to 3 per cent. of wood spirit is also recoverable.

The following table shows the approximate quantities of primary products obtainable by dry distilling one ton of shells.

It is a remarkable feature that the tar, when distilled up to 280°C, leaves only about 25 per cent. of pitch; and the phenols constitute over 30 per cent. of the total. The higher boiling phenols (given in the table as "creosote") have not been fully investigated; they seem (unlike beech wood tar) to contain little or no guaiacol.

The rubber industry in Ceylon uses about 300 tons of acetic acid every year for latex coagulation. Consequently a plant was erected in Ceylon for the production of acetic acid. It was not possible to develop byproducts owing to the difficulty of obtaining plant. There was however some recovery of wood naphtha, which was used for the production of French polish and varnish; the tar is simply distilled and the water-free distillate supplied as a wood preservative; whilst there was some demand for the pitch from boat builders.

With further applied research, the prospects for post war developmnts of an industry based on the distillation of coconut shells seem good.

OTHER APPLICATIONS.

The pentosans of coconut shells are largely xylosans and good yields of xylose can be obtained by dilute acid hydrolysis. The use of concentrated acids leads to furfural; this substance has industrial applications but there are cheaper sources such as waste vat hulls, corn cobs, etc. By alkaline oxidation a mixture of vanillion and syringaldehyde is obtained; this observation at present has no obvious commercial application, but throws light on the interesting chemistry of lignin of

coconut shells. The lignin seems to differ somewhat from most wood ligins, at least. There are considerable differences in the distillation products and investigation will probably be of interest in the elucidation of the general chemistry of lignin.

USES OF SHELLS AS SUCH.

Shells or stictly speaking, half shells (the half without the eyes) are used in their natural form in Ceylon and other coconut growing countries for drinking bowls, rubber latex collecting cups, oil measurement by grocers, and the like. The whole shell is mainly used as smoking hukka by Indians. Various carved articles of very attractive appearence are made by craftsmen from the shells.

COCONUT SHELL FLOUR.

Finely ground coconut shell has become a commercial product, used as a filler in plastics. It gives a smooth and lustrous finish to moulded articles, and improves resistance to moisture and heat.

Lastly it may be of interest to refer to another "use" of finely ground shells. In 1900 it was reported in America that powdered coconut shell was commonly used to adulterate spices. Such adulteration has not been recently reported, in any case it is not difficult to detect either chemically or microscopically.

SOME IMPORTANT INDIGENOUS DYES.

SINCE the introduction of aniline dyes, the value of formerly important vegetable dyes obtained from forest trees and plants has been greatly reduced. There are, however, a considerable number of these dyes, and although most of them are now of local interest only there are still a few which retain their former importance. The following extract from "Indian Forest Utilization" may be useful to our numerous readers. These indigenous dyes are classified under several heads namely wood dyes, bark dyes, flower and fruit dyes, root dyes, and animal dyes.

WOOD DYES.

The wood dyes may be discussed first. These are santaline, Brazilin, etc.

SANTALINE.

One of the best known of these is santaline dye from pterocarpus santalines, the red sanders tree of Madras. The wood of this tree yields a bright red dye used as colouring agent in pharmacy, for dyeing leather and staining wood, and when dissolved in alcohol it dyes cloth a most beautiful salmon-pink colour.

BRAZILIN.

Caesalpinia sappan wood also yields a valuable red dye, known commercially as brazilin, owing to the scattered distribution of the tree, it is very difficult to obtain. To compete with the same product from Brazil some special organisation is required.

ARTOCARPUS DYES.

The wood of the jack tree, Artocarpus integrifolice, as also that of Artocarpus lakoocha, if ground to powder and boiled in water, yields a bright yellow dye used for colouring cloth and especially for dyeing the robes of Buddhist monks.

CUTCH DYE.

The dyes mentioned above are the more important wood dyes used at the present time, but the use of cutch extract from Acacia Catechu should not be overlooked. This extract is by far the most valuable dye agent that India possesses. It has the valuable property of being a tan extract as well as a dye agent, but its great value comes from its preservative qualities when used for tanning and dyeing canvas, leather, or cloth for marine purposes.

BARK DYES.

Many barks yield brown and black dyes, but as the same barks are often used

for tanning purposes, the dye contained in them is, more often than not, considered a defect rather than an asset.

Bark dyes are not important, but the followoing may be mentioned as being of local interest. Terminalia tomentosa, Berberis nepabensis, Acacia Spp., Alus madras Patana, and Casuarina equisatifolia, the bark of which is used by Madras fishermen for dyeing their nets.

FLOWER AND FRUIT DYES.

More important, generally speaking, than wood, bark and root dyes, are the natural dyes obtained from the flowers and fruits of many forest trees, the right of collecting these flowers is usually formed out to contractors or to merchants,, who employ regular collectors from the neighbouring villages. The number of species in the forests of India yielding flower dyes is very large and probably run into many hundreds, but of these only a few are of real importance, the remainder being of local interest only.

KAMELA.

One of the best known flower (fruit) dyes is that obtained from the red glands on the surface of the capsule of Mallotus philippinensis, and known commercially as kamela powder. The tree is a small one with a fluted trunk and is fairly common throughout India and Burma, especially along the sub-Himalayan tracts. Kamela powder is usually obtained by placing the ripe fruits in a cloth or sack and beating and shaking the sack until the red powder is all removed from the glands. The powder is then sifted free from the broken refuse and is ready for marketing. It can also be obtained by rubbing the fruits between the hands, or by stirring them in water and drying the powder sediment. The dye is extensively used for dyeing silk a bright orange or flame colour and, mixed with other ingredients, the colour can be turned from pale yellow to dark red. Kamela powder is also used as a vermifuge in veterinary practice.

ANNATTO.

Another well-known dye is the annatto dye of commerce, obtained from the pulp surrounding the seeds of Bixa orellana extensively cultivated in South India. The dye is obtained by boiling the fruit pulp and pressing the residue into cakes, the form of which it is usually exported. The dye gives a beautiful pink colour to silk and cloth, and when mixed with Kamela powder can be toned upto a vivid orange-red. It is exported to Europe where it is employed, amongst other uses, for colouring cheese and butter.

DHAK, ETC.

Another popular flower dye is that obtained from the well-known dhak tree or flame of the forest, Butea frondosa. The dried flowers yield a bright yellow dye which is extensively used for colouring Indian Saris, but when used by itself, the dye is not very permanent and has been supplemented to a large extent by the more permanent aniline dyes.

Amongst other flowers and fruit dyes may be mentioned those of ochrocarpus longifolius yielding a red dye used for colouring silk, wrightia tinctoria, the seeds of which produce a blue colouring agent similar to indigo, and the flowers of cedrela toona, Nyetanthes arbor-tristis, and Michelia Champaka, all of which yield yellow dyes, used for colouring silks and cloth.

ROOT DYES.

Here again, there are numerous forest trees and plants whose roots yield dyes of varying quality, but the majority are unimportant from a forest point of view and are only used locally by villagers who are unable to procure anything better.

The most commonly used are those obtained from the roots of Berberis aris-

tota, Morinda tinctoria, Symplocos spp., Datisca cannabina, and Punica granatum, all of which yield dyes of yellow and red shades.

ANIMAL DYES.

Animal dyes are not usually considered worthy of mention under forest products, but there is one dye which, although no longer important from an economic point of view, deserves mention on account of its interesting associations. The dye referred to is the crimson dye obtained from Lacciper lacca, the lac insect. In former years lac dye was an important commercial product, but of late it has gone into partial disuse owing to the superiority of modern chemical dyes.

TRANSPORT OF PLANTS, SEEDS & FLOWERS.

THE conveyance of plants or seeds over long distances is a question which not unfrequently confronts one in the tropics, and upon it often depends the successful development of a new planting industry. In cases where seeds are not procurable, or are of a particularly perishable nature, recourse must be had to plants for securing a supply. Unquestionably the best means so far invented for transmitting these over long journeys, especially by sea is in Wardian cases, by the aid of which the exchange of live plants between widely separated countries has been greatly facilitated. Thus the introduction of Rubber, Cacao, and other useful plants from the Western to the Eastern tropics, and others vice versa, is due largely to the excellent Wardian cases. A Wardian case consists of a large box, with two sloping glazed sides which meet at the top to form a ridge, the two ends being carried up like a "V" inverted. Thus the sides are movable, with the glass pan fitted in grooves with putty, and protected on the outside with narrow thin strips c wood about an inch apart. A small cir cular hole, covered by perforated zinc, i made in each end, and over this (inside is nailed a small box to catch any se spray, etc. that may get in. Therefore Wardian case, when travelling, is nearl airtight, so that very little evaporation o change of air can take place within it. Th bottom of the case is filled with soil, i which the plants to be conveyed are pack ed closely together and held in positio by narrow strips of wood, which are firm ly secured by being nailed down to th inside of the case. Wardian cases ma be made of any size to suit large or smal plants. They have been of the greates service in despatching Rubber, Cacac and other plants to different part of the tropics. When transporting caca and other seedling plants in Wardia cases, the best way of establishin them so as to stand the journey is to sov the seed in the case, a sufficient depth o good light soil being placed in the botton for this purpose, so that the seedlings ma grow enroute. When the seedlings ar well above ground, thin bamboo twig may be placed between them over th soil, these being held down by strips o wood, the ends of which are secured by a longitudinal strip nailed on to the insid of the case on either side. The case is the ready for despatch, liberal watering bein given to the contents before the sides ar closed down.

PLANT CASES IN TRANSIT.

The success of any method of pack ing plants will largely depend on th position assigned to these on carriage o boardship. Obviously they must hav access to light and air, but should not b placed on the lower main deck if on a long voyage, as they would thus be liabl to be injured or killed by the sea spray o breakers. The best part of a ship fo

plants is the upper deck but not too near the engines. Plants in an action state of growth will be benefitted by an occasional watering, if this can be given by an intelligent hand. Much also depends on the season. Tropical plants can only be transported safely over long journeys during the summer month; while deciduous plants, or those of temperate countries, travel best when in a dormant state.

WARDIAN CASES.

The following are brief instructions for the guidance of persons sending Wardian cases of plants from the tropics. The cases should be kept on deck under awning, away from the engines; direct exposure to the sun unless the cases are open will injure the plants. A Wardian case is easily opened by unscrewing one on both the glass sides. In tropical seas during fine weather, one of the glazed sides may with advantage be left partly or fully open during the day. The plants may be lightly watered or sprinkled with fresh tepid water at least once in three days. In cool latitudes less watering is required, and the cases should then be protected at night with some additional covering.

PACKING & TRANSPORTING SEEDS.

In regard to imported seeds of annuals, culinary vegetables, etc. of temperate climates, it has been found that, provided the seed is properly dried, the best way of transporting them is in air-tight tins. Seedsmen who make a speciality of sending such seeds on long journeys pack them in hermetically sealed tins, in a dry atmosphere, so that the seeds are not affected by heat and sweat on the voyage. No packing material of a preservative kind is thus required. A similar method will suit certain tropical seeds; but these are often of a fleshy non-driable character, naturally unadopted to a dormant period, and require to be packed with a absorbent material; the tins or boxes containing them should not be hermetically sealed tins, as otherwise fermentation will set in and destroy the seed. Thus, seed of (para) rubber which are normally of short vitality, packed in ordinary biscuit tins, with a mixture of dry powdered charcoal and fine soil or coir-dust, have been transported over journeys of 6 to 8 weeks, and at destination gave germinative results of 70 to 80 per cent. Seeds which are surrounded by a mucilaginous substance should have the latter washed off, then be rapidly dried in the sun, after which they should be packed with a dry preservative materials as described above, and despatched without delay. To this class of seed belong cacao, castillva-rubber, etc. It has been found in the case of such as these that if the seeds, while moist and after being washed, are mixed with dry charcoal powder, the latter upon drying forms an effective preservative coating around them. Sometimes the pods are sent in paraffin wax, which keeps the pods fresh and well protected for a number of weeks. The method is as follows:—The pods are first thoroughly washed with a tooth-brush and soapy water, then placed in 70% alcohol for a minute, and afterwards in a 5% solution of corrosive sublimate for a few minutes, so as to kill the germs on the surface. A price of string being then attached to the stalks end of the pod, the latter is dipped in the liquefied paraffin: it is taken out immediately and hung carefully by the string so as not to break the thin coating of wax. When cold, each pod is again dipped in the paraffin, making the coating more secure. The fruits are then packed in fine saw dust and despatched.

Seeds of a very perishable nature should be packed only in small quantities.

and in such tin boxes as do not effectually prevent the escape of moisture. If transmitted by post, stout canvas should be used as an outside covering, or if sent as steamer freight they should be placed in wooden cases. Coir-dust when hached and intermixed with a proportion of powdered charcoal forms an excellent packing material for many short-lived seeds. Burnt rice and dried sawdust are also used with good results. As a rule any such packing material should have only the slightest trace of moisture left in it. On the otherhand, seeds of certain water plants are best transported in small tubes or vials of water, which being made water-tight with wax may be easily packed with straw in a section of bamboo, and despatched by post.

TRANSPORT OF BULBS OR TUBERS.

These are always best transported when the plants are in a dormant or resting condition. In the tropics, however, this is not usually practicable as the plants may be said to be seldom in that state. In this case the bulbs or tubers should be gradually dried until all the leaves have thoroughly withered, when they should be cut away. The bulbs may then be packed in dry sawdust or coir-dust for export. Small quantities may thus be placed in ordinary biscuit boxes and sent by parcel post. If packed in a larger box for shipment, it is well to bore a few ventilation holes in the box.

SENDING FLOWERS.

The flowers should preferably be cut with a sharp knife, and not broken off; cutting with scissors is apt to squeeze and close the tubes of certain flower-stalks, thereby preventing the absorption of moisture when placed in water. Flowers should be cut in the early morning, when they are full of moisture. In packing, the box should be lined with moss or fresh leaves; no cotton-wool or other absorbent substance should be used as a packing, the best material for the purpose being fresh leaves or fern fronds. The flowers should be packed firmly, but not crushed in any way, and are best not tied in bunches, except in the case of small flowers. Tin boxes with movable trays are the best receptacles for sending flowers long distances, either by rail or post.

SOLID EAU DE COLOGNE.

SOLID Eau de Cologne consists simply of a transparent soap containing the perfume. The transparent soap may be prepared by the alcohol process, that is, by dissolving high grade soap millings together with the cologne essences in about ten times their weight of alcohol. About 90 per cent. of the solvent is distilled off, and on rapid cooling, the mass sits solid and can be moulded as required.

A cheaper method which avoids distillation and will give a good base, makes use of transparent soap prepared by the sugar process. The soap is made transparent by melting with 15-30 per cent. of cane sugar, and no distillation is necessary. The following is a good method:—

Melt together	
Fine soap millings (well saponified)	100 parts.
Cane sugar	25 ,,
Water	25 ,,
When melted add Linalyl acetate	5.5 ,,
Citronellol	6 ,,
Petitgrain oil	7 ,,
Rhodinol	2 ,,
Terpinyl acetate	1 part.

Pour the product to moulds and allow to set. It is preferably put into a metal container for sale, but failing this it should have foil moisture-proof wrapping. The addition of menthol to the formula makes the solid cologne cooling in its effect and is an invaluable remedy for headache.

Pharmaceutical Recipes

BURN POWDER.

Zinc oxide	1	oz.
Light magnesium carbonate	1	„
Boric acid, powdered	1	„

Mix well and sift.

Directions: To be dusted freely on the effected part.

MOUTHWASH POWDER.

Sodi bicarb	8	oz.
Saccharine	1	„
Vanillin	30	gr.
Coumarin	20	„
Benzoic acid	20	„
Oil of cloves	½	dr.
„ caraway	½	„
„ lemon	½	„
„ wintergreen	½	„
„ peppermint	½	„
Carbolic acid	½	„
Oleo-resin capsicum	½	„
Carmine	20	gr.

Mix thoroughly. One tea spoonful to be dissolved in half a wine glass of water and used as a mouth wash.

PILL-COATING SOLUTIONS.

Gelatin Coating.

Gelatin	2½	oz.
Acacia mucilage	1¼	„
Boric acid	3	dr.
Distilled water	7½	oz.

Dissolve the acid in the water, and in the solution immerse the gelatin until soft; dissolve on a water-bath and add the mucilage, stirring all the time.

Pearl coating.

Acacia mucilage	1	oz.
Tragacanth mucilage	1	„
Syrup	1	„
Water	4	„

Mix.

Pearl coating is an art. The requisites on the small scale are an evaporating dish and two round tin boxes. The best powder for coating is French Chalk, alone or mixed with light magnesium carbonate in the proportion 1: 2 and 5 to 10 drops of methyl blue to counteract its yellow tint. The pills are to be moistened with the solution in the dish and transferred to tin boxes containing plenty of powder, and rotated rapidly. Next transfer to and rotate in the second box without French chalk, in order to impart a polish.

Sugar coating.

The best plan is to proceed as for pearl coating, using a mixture of pearl-coating powder 7 parts and sugar 1 part, or ½ dr. of sachharin to the pound of French chalk. The true sugar coating is done with sugar syrup containing a small percentage of starch, applied by means of a revolving pan.

BLOOD-PURIFYING POWDER.

Dried Glauber's Salt	1	oz.
Dried Epsom Salt	7	„
Common Salt	1½	„
Tartaric acid	1½	„
Bicarbonate of soda	2	„

Mix well.

Dose: 1 dr. in a glass of water every morning.

MAGNESIA LOZENGES.

Powdered sugar	24	lbs.
Heavy carbonate of magnesium	3	„
Prepared chalk	3	„
Powdered orris	3	oz.
Nutmeg oil	2	dr.
Gum acacia	2½	oz.
Water	40	oz.

Make a mucilage of the gum with the water, and mass in the usual manner.

TOOTHACHE DROPS.

Coniine (Pure)	1	
Oil of cloves	4	
Oil of cinnamon	4	
Alcohol	2	dr.

Directions: Put one drop on a pledget of absorbent cotton, and apply to the hollow tooth. This acts like a charm in some instances.

DYSPEPSIA POWDER.

Ajowan Seeds, powdered	1	oz
Rock Salt	1	„
Asafoetida (Hing)	1	„
Myrobalans	1	„

Mix.

Dose: 10 to 20 grains.

SPLEEN POWDER.

Ginger (Sonth)	10	grains.
Rhubarb (Raven Chem)	5	„
Ferri Sulph	2	„
Quinine	2	„

Mix and make one packet. This is for one dose.

LIQUOR FERRI IODIDE.

Iron wire, cut small	1	oz.
Iodine	2	„
Water	2	dr.

Place the iron wire and iodine in a flask and add the water; warm gently to start the action, and set aside until action ceases and the whole of the iodine is combined. Decant, add 1 dr. of concentrated hypophosphorous acid, filter, and wash the filter with water which has been used to wash out the flask. Product 4 oz.

One volume of this solution to 7 volumes of thick syrup makes syrup ferri iodide B.P.

Recipes for Small Manufacturers

PINE OIL DISINFECTANT.

Castor oil	35	parts.
Caustic potash	8	„
Pine oil	15	„
Water to make	100	„

Heat the castor oil and the caustic potash dissolved in 30 parts of water, until saponification is complpete. Then add the pine oil and complete with water to make 100 parts.

GOLF-BALL PAINT.

White lead, ground in oil	10	parts.
Zinc white, ground in oil	10	„
Ultramarine blue		trace.
Coach varnish	q.s.	

Mix the white lead and zinc white ground in oil. Then add a small quantity of ultramarine blue to ensure perfect whiteness and then mix sufficient of coach varnish to thin the varnish.

FROSTING GLASS.

Gelatin	5	grams.
Water	100	c.c.
Dissolve and add sodium fluoride	5	grams.

Shake vigorously and apply while warm to the glass, which is placed aside until dry, then immersed in dilute hydrochloric acid, (this operation must be performed with due caution to avoid irritation of the eyes or lungs). When dry the glass is washed with hot water to remove the gelatin.

MOSQUITO OIL.

The following mixture is very effective in keeping off mosquitoes:—

Olive oil	3	parts.
Oil of pennyroyal	2	„
Glycerin	1	part.
Ammonia	1	„

Mix. To be well shaken before applying to the face and hands. Avoid getting the mixture into the eyes.

ADHESIVE FOR FASTENING SPLIT LEATHER.

Starch	3	oz.
Rectified spirit	8	„
Gelatine	1	„
Water	1½	„
Turpentine oil	1½	fl.oz.

First rub up the starch powder and spirit. Then in a separate pot soak the gelatine in water for an hour and then dissolve it by applying gentle heat or over water bath. Now add the turpentine and while this glue compound is boiling hot stir in the starch paste and raise to the boil for a few minutes. This compound, when properly prepared, will not penetrate through the fibre of the leather to spoil the dyed surface.

COLD SOLDERING.

Crush and mix 6 parts of sulphur, 6 parts of white lead and 1 part of borax. Make a rather thick paste by triturating with sulphuric acid. The paste is spread on the surfaces to be welded, and the articles pressed firmly together. Within a week the soldering is so strong that the two pieces cannot be separated even by striking them with a hammer.

BOILER COMPOUND.

Soda ash	87	oz.
Trisodium Phosphate	10	„
Starch	1	„
Tannic acid	2	dr.

Use powdered materials, mixing well and then pass through a fine sieve.

PAINT BRUSH CLEANER.

(a)	Kerosene oil	2	pints.
	Oleic acid	1	pint.
(b)	Strong liquid ammonia	½	„
	Denatured alcohol	½	„

Mix.

Nowslowly stir (b) into (a) until a smooth mixture results. To clean brushes, pour into a can and stand the brushes in it overnight. In the morning, wash out with warm water.

MARKING CRAYONS (GREEN).

Ceresin	8	oz.
Carnauba wax	7	„
Paraffin wax	4	„
Beeswax	1	lb.
Talc	10	oz.
Chrome green	3	„

Melt the first four ingredients in any container and then add the last two slowly while stirring. Remove from the heat then continue stirring until thickening begins. Then pour into moulds. If other colour crayons are desired, other pigments may be used. For example for black, use carbon or bone-black; for blue, Prussian blue, for red, orange chrome yellow.

TOOTH POWDER.

Precipitated chalk	565	grams.
Magnesium carbonate (Light)	420	„
Borax	55	„
Sodium bicarbonate	45	„
Soap, powdered white	50	„
Sugar, powdered	90	„
Wintergreen oil	8	c.c.
Cinnamon oil	2	„
Menthol	1	gram.

Dissolve the last three ingredients together and then rub well into the sugar. Add the soap and borax mixing well. The chalk with good mixing and then the sodium bicarbonate and magnesium carbonate. Mix thoroughly and sift through a fine wire screen. Keep dry.

In the Field of Invention

SPHERICAL METAL FORMATION.

An improved method of obtaining spherical lead shot, with a minimum of tear-shaped particles, is claimed by a French patent. The process may be of value in powder metallurgy. In the usual method of forming lead-shot by allowing molten lead to fall a considerable height from a container with perforated bottom many of the particles become tear-shaped and have to be remelted, especially if the lead is not pure. Addition of arsenic has been proposed as a remedy.

In the present invention, the molten lead during its fall comes into contact with a reducing or inert medium, whereby the particles are rendered completely spherical, even with impure lead. The reducing medium may be liquid or gaseous e.g. nitrogen or carbon dioxide, hydrocarbons such as butane. The method is applicable to zinc, cadmium, tin and tin alloys. The action of the inert or reducing medium is to prevent the formation of the oxide layer—which reduces surface tension of drops and thus causes them to form tear shaped particles.

—JOURNAL OF SCIENTIFIC & INDUSTRIAL RESEARCH.

A NEW METHOD FOR FIREPROOFING.

A normal method employed for producing flame-proof effects on textile materials consists in the application of a mixture of borax-boric acid to the fabric. The process is one of padding the fabric through an aqueous solution of 7 lbs. of borax and 3 lbs. of boric acid per 10 gallons of water, squeezing and drying. The flameproof finish obtained in this manner, however, is not durable being easily removed by a mild washing treatment.

A method developed by Imperial Chemical Industries is one of using an insoluble inorganic salt in conjunction with plasticised polyvinyl chloride. Fabrics to be rendered flame-proof in this manner are first impregnated with a soluble metallic salt of iron or zinc, such as ferric chloride or zinc sulphate. The fabric is next run through a caustic soda solution in the case of the ferric chloride, or borax solution where zinc sulphate is employed. Iron oxide or zinc borate respectively are eventually deposited on the fabric and after the two process, the material is finally dried. The material carrying either the iron oxide or zinc borate is then coated with or impregnated with plasticised calatac VCU (a P.V.C. dispersion) then dried and baked. A finish is finally obtained which shows excellent flame-proof effects on cellulosic materials and has a high degree of fastness to laundering.

—JUTE & CANVAS REVIEW.

NEW FIBRE RUG COATING.

A new vinyl coating compound for fibre rugs, called "Vybon R" is announced by the E. R. Graff Co. Inc. "Vylon R" is described as venyl co-polymer water emulsion, that forms a water clear coating that will not discolour in sunlight, crack, craze, peel over because tack in warm or damp weather. It is impervious to oils, greases, alcohols, beverages, alkalies and most stains and can be easily cleaned with a damp cloth. In addition it adds fade resistan and fire retardent qualities to the fibres.

Tests have proved the finish to have a high resistant to abrasion increasing, the life and utility of the rug. Fire and toxic odour hazard usually associated with other coating compound during production have been avoided by the el mination of volatile solvents. Roller or spray coating equipment is used and standard drying units for curing at temperature as low as 150°F

—JUTE & CANVAS REVIEW

NEW MECHANICAL MICA SPLITTING MACHINE.

It is understood that following a study during the 2nd Great War scientists of the U.S National Bureau of Standards have succeeded in producing a mechanical mica splitter in the search to find a more feasible means of producing thin films then the tedious hand method commonly employed.

After bulk methods of delamination by physical or chemical treatment failed to provide satisfactory results, Messrs. Kessler and Anderson concentrated their efforts on developing a mechanical process. The resulting mica splitting machine not only promises to speed up the process considerably but will greatly reduce the period required to train skilled splitters.

Due to common mica imperfections such as unequal spacing of clearage planes, are precise control of film thickness has been obtained. The quality of machine-split films, however, compares favourably with that of hand-split film.

Like a hand splitter, the machine starts thir sheets by introducing a sharp point into the edge of the mica block. A master valve at the centre of the turntable connects the chuck to the vacuum line to hold the block in position while it is being split, on travelling forward, a carriage moves the chuck a short distance, causing the splitter gauge to raise a film of mica As the carriage returns to its starting point, two stripper blades pass under the raised film to separate it from the block. The free end of the conveyor draws the loosened film to the belt which carries it to a receptacle. The use of a electro-magnet to obtain a rapid vibration of the striper is conemplated to increase the effectiveness of splitting.

Formulas, Processes & Answers

TRACING CLOTH.

1065 D.N.G., Sambalpur—Wants to know a process of making tracing cloth and also waterproof drawing ink.

Boiled linseed oil, bleached	10 lbs.
Lead shaving	½ lb.
Zinc oxide	2½ lbs.
Venice turpentine	½ lb.

Boil the mixture for several hours, then strain and dissolve in the strained composition 2½ lbs. white gum copal. Remove from the fire and when partly cold add oil of turpentine (Purified), sufficient to bring it to proper consistency. Moisten the cloth in petrol and give it a flowing coat of the varnish.

VERMICELLI FROM SWEET POTATO.

The production of vermicelli from sweet potato is very simple and inexpensive. The tubers are first washed clean of adhering soil. The dry end of the tubers and hair like rootlets are removed and the tubers boiled in water until they become quite soft. The water required for boiling should be sufficient to cover the tubers completely. A pinch of salt added at this stage not only improves the taste of the prepared vermicelli but also prevents the tubes from getting over-boiled. Cooking takes about an hour to be completed. The cooked tubers are peeled and mashed to free them from fibrous materials. The mash is then put through a hand press provided with fine holes. A slow, steady and even pressure is necessary to get a product of uniform quality. For efficient working without interruption it is desirable to have at least two mould plates, so that one could be cleaned when the other is in use. It has been found in practice that the mould plate gets clogged with the mash and needs frequent cleaning. The wet vermicelli is received as it comes out of the press on a clean sheet of white cloth and dried in the sun for about an hour. By this time it becomes sufficiently dry to be removed easily from the sheet. It is then transferred to another clean sheet and dried in the sun thoroughly and stored for subsequent use.

Extract from—Madras Information.

WATERPROOF DRAWING INK.

Nigrosin	1 dr.
Borax	½ oz.
Shellac	1 oz.
Water to produce	12 oz.

Dissolve the borax in the water. heat and add the shellac and continue heating and stirring until all is dissolved. Add the nigrosin to the warm solution, stir until dissolved, and strain through a muslin or flannel cloth. If too thick dilute with a little alcohol.

PREPARATION OF DEXTRINE FROM POTATO STARCH.

887 K.S., Mallikari—Wants to have a practical process of preparing dextrine from potato starch.

In making dextrine the potato starch is homogeneously mixed with the water in which the nitric acid and a metallic catalyst are added. For every 100 grams of starch, 10 c.c. of water, 0.225 c.c. of strong nitric acid (sp. gr. 1.40) and manganese chloride equivalent to 0.02 manganese are employed. The equivalent wet starch is dried either in a drying chamber or in a pan heated by water at a temperature not exceeding 90°C. A higher temperature should not be used as the dextrinisation might start prematurely with the formation of bad clots. After the mixture is dry it is next sifted through a 40-mesh sieve and little clots that may have formed are crushed and passed through the sieve. A free and homogeneous dry powder is obtained which will pass to the dextrine stage in its natural form.

The vessel for carrying out the dextrinisation is best made of copper having round and shallow shape with a flat bottom so that the starch can remain spread at the bottom of the pan. The copper pan should be placed inside on outer vessel made of sheet iron maintaining an annular space all round. The space between the pan filled up with a suitable heating medium like beeswax which will admit of easy heating to the temperature of dextrinisation without much disengagement of vapour. The bath should be heated and maintained at a temperature of 170°C and the treated and dried starch is added to the pan and the starch is stirred with a copper trowel. During stirring it is essential that the mess should get continually mixed. The completion of the process approximately takes about 45 minutes to one hour which is ascertained by taking out a small spoonful of the product and adding to it 5 times its weight of water when a water clear solution having no cloudiness should be obtained. It should also be tested for full dextrine reaction with iodine solution.

Other starches, such as rice, potato, etc. may also be used in preparing dextrine.

SILK SCREEN-PRINTING.

1224 V.M.B., Gondia—Desires to know a process of silk screen printing.

Printing by the silk screen is very practical in the decoration of expensive materials such as silks and satins—especially so in the ornamentation of scarfs and similar novelties.

Due to the fact that until recently these screens were made by hand, working with complicated designs required great skill and plenty of time, as these designs had to be painted on the screen by means of paint and brush.

With the aid of photography it is possible to achieve much better results in accuracy and brilliance of design, in less time and with less effort and skill. A brief description of the process is as follows:—

A piece of fine blotting cloth is mounted on a frame of hard wood. The cloth is stretched well and fastened to the wood by carpet tacks. The blotting cloth is permeable to colour paste and fluids of high consistency. It is the objective to render it impermeable by the application of certain chemicals.

The first step is the sensitizing of the screen.

For the preparation of the light sensitive emulsion the following formula will lead to desirable results.

Fish glue	85	grms.
Belting cement	45	"
Ammonium bichromate	10	"
Albumin (or the whites of eggs)	5	"
Distilled water	500	c.c.

Dissolve each of these substances separately in warm water, then mix in the order given above, add one to three drops of strong ammonia and stir well. After the emulsion has been allowed to ripen in a dark place for 24 hours it is ready to be spread on the screen.

It the sensitizer is then applied to the screen by means of a brush, great care should be taken to avoid strick, uneven coating or pin holes.

Raise one end of the screen about 5 inches and pour the emulsion over it, catching it at the lower end; repeat this 1 or 2 times. The screen is then placed on the table, and a scraper is moved up and down along the screen until the coating becomes even and the emulsion sets. The screen is next allowed to dry for 24 hours for the drier it gets, the more sensitive it becomes. It is understood, of course, that the entire operation is performed in a dark room.

The design which is to be produced on the screen, is first drawn on any drawing board and then traced in opaque ink in transparent paper. Great care must be taken that the lines on the tracing paper be clear and that there be no holes in the ink-covered outline. Since for each set of lines of the same colour one screen is needed, it is evident that the number of screens required for one design depends upon the number of colours the design contains.

Talcum powder is now spread over the inside of the screen and soft flannel or velvet placed on top of it, and the latter is covered with a cardboard, inch shorter than the screen in length as well as in width in such a way as to make the velvet exert a slight pressure on the blotting cloth; then heavy logs are placed on top of the cardboard in order to keep it in place.

There are two methods of exposure: the design can be pasted on a glass plate resting on a pair of horses or in a wooden frame and the screen put on top of it. The source of light should be underneath the glass plate.

This method has two shortenings: (a) contact between screen and design is not perfect, (b) the source of light must be placed underneath the screen. This is impractical when exposing to arclight and impossible when making use of sunlight. The following method is therefore employed.

A very thin film of colourless axle grease is spread on the screen and the design under top of it with the inked side of the paper touching the silk. Then, by means of a scraper squeeze, all excess green and air bubbles are removed, and the tracing paper smoothly pasted on the screen. Now the screen may be stood up against a wall and expose to sun, arc or electric light.

The time of exposure will vary with the light used. 30 to 60 minutes' exposure to arc light will be sufficient, whereas shorter and longer periods of exposure will be needed with sun and electric lights respectively. Over exposure will make developing very difficult. The correctly exposed screen should be gold-brown.

Cardboard, velvet, and tracing paper are now removed from the screen, and the grease is washed off by means of a piece of cotton dipped in acetone.

The action of the light has rendered the exposed ammonium-bichromate-gum coating insoluole in water, while the unexposed coating can be dissolved by a mild hot water. While developing one must never rub the screen, because that would remove the entire coat.

In order to harden the coat it is immersed in the following bath for about 5 minutes.

Distilled water	4	litres.
Methyl alcohol	½	"
Bichromate of ammonia	14	grms.
Chromic acid	1	"

If it is desired to print with pastes of aniline dyes the emulsion must be protected against the action of water and of the small amounts of acids present, which would gradually dissolve the whole coat. This protection is easily achieved by coating the screen with

an enamel paint. The latter is spread over the screen in the same manner as the sensitive film and removed from the uncoated parts of the screen by means of cotton which is soaked in benzine. The covering of the emulsion will of course, remain undisturbed. The enamel coat is applied on both sides of the screen.

Finally it is advisable to tape the inner and outer edges of the frame so as to cover up the spaces between silk and wood, where paints might accumulate and make the cleaning of the screen very difficult.

PAPER PULP.

1112 R.N.C., Gauhati—Desires to know a process of making paper pulp.

To make pulp the fibrous materials such as cotton stalks, waste paper, old cloths, grass, etc., are to be cleaned, sorted and cut to small pieces. The cleaning and sorting can be done by dusting, beating or sifting the material either on a sieve or a floor, or on mats. This process is somewhat the same as winnowing seed or grain from husk. After this the material should be cut into pieces an inch or two in length. It should not be cut too small as it would injuriously affect the cellulose fibre, ultimately injuring its properties.

The instruments required in cutting are either a hatchet or an axe or a knife hooked or crooked or straight, or a kadba cutter (jowar, maize or grass stalk cutter) and a block of wood.

After cutting the materials are soaked in water. The period may be varied from two days to two weeks according to the nature of the material. About 10 seers of material are steeped at a time in a reservoir in which a small quantity of lime has been added. After a day or two these are taken out and pressed to squeeze out the water from it as far as possible.

The whole mass is then subjected to the process of pounding. The operation is carried on with the help of dhenki or the indigenous treading mill. Three or four workmen work on it and this operation, which is the most laborious part of the business, takes about 8 to 10 hours to complete. The mass is then kneaded against an earthen apparatus called mejlish until the whole is turned into a soft consistency. This mejlish is a flat dish made by the country potters and has a rough surface (sprinkled with lime stones).

The mass is again soaked, in diluted lime solution in which some saji has been added for about 2 days, then washed in a stream of water or tank holding it in a canvas chaddar. The washing is continued until the washing water is clean.

PRESERVING SYRUP.

1132 C.T.L., Calcutta—Wishes to have a process of preserving syrup.

The preservation of syrup as well as of a sugar solutions, is best promoted by keeping them in a moderately cool, but not a very cold place. Hence to ensure preservation of the syrup the usual practice with the manufacturers is to keep it in vessels well-closed and in a situation where temperature never rises high. They are kept better in small than in large vessels for the longer a bottle lasts, the more frequently will it be opened and the syrup consequently will be exposed to air. By bottling syrups while hot and immediately corking up and tying the bottle over with a bladder perfectly air-tight, they may be preserved at a summer heat for years without fermenting or losing their transparency.

ROSIN AND TURPENTINE OIL.

1155 N.S.K., Jullundur City—Desires to learn the process of making rosin and turpentine oil.

Rosin is the residue left in the still after the turpentine oil has been distilled off. The raw material chiefly employed for the purpose is oleo-resin.

Turpentine oil is usually manufactured from oleo-resin a gummy substance obtained by tapping chir pine (Pines longefolia) a species of plant found in large numbers in the Punjab and the United Provinces.

To extract the oil, melt the oleo-resin by the help of steam. In order to enhance the process add a little turpentine oil obtained from previous operation. By this treatment the dirt, water and other suspended impurities will sink to the bottom of the vessel. Then transfer the clear oleo-resin into a suitable tank, from which from time to time a measured quantity of the substance is passed into the distilling vessel, which is provided with a steam jacket and kept hot by steam under pressure to maintain any desired temperature. Inject the steam under pressure whereby the oil of turpentine together with water vapour is distilled over. Lead the vapour through an empty vessel and then into a condenser. The object of putting the empty vessel into the intermediate position is to catch any oleo-resin that may have come over during the process. The liquid

turpentine and water which collect in the receiving vessel at the further end of the condenser are now separated from each other mechanically. The oil thus obtained contains much impurities which may be removed by redistilling the oil in a separate vessel and passing through lime water. The purified oil still contains traces of water which are at present removed by storing the oil for a time in bulk.

BLEACHING CARDAMOM.

1164 U.B., Sukrawar Taluq—Wants to know the method of bleaching cardamom.

To bleach cardamom dry the matured fruits in the sun for four or five days. Then expose the fruits to the vapour of burning sulphur and steam for a few hours. By this treatment the cardamom is totally bleached though the fruits suffer very greatly. Another method of bleaching is to treat the cardamom with soapnuts (ritha) in presence of water. This treatment not only improves the colour but also the flavour of the spice.

INCANDESCENT MANTLES.

1086 K.C.N., Quilon—Desires to know a process of making mantles.

Mantles are knitted from artificial silk fabric, cut into suitable lengths and stitched. These are next dipped in the following impregnating solution:—

Thorium nitrate	1000	parts.
Cerium nitrate	10	„
Magnesium nitrate	1½	„
Beryllium nitrate	5	„
Distilled water	2000	„

Mix. The time of immersion of the artificial silk mantles varies from about 2 minutes to about 13 minutes according to the nature of artificial silk.

SYNTHETIC INDIGO

1161 H.L.K., Jodhpur—Wishes to have a process of preparing synthetic indigo.

To prepare indigo heat aniline with chloracetic acid of equal proportion for 1 to 2 hours whereby phenylglycine is obtained. This is then fused with sodamide (prepared by heating metallic sodium in a stream of dry ammonia gas) when the phenylglycine is converted into indoxyl with the evolution of ammonia gas, which should be collected and used again. To obtain indigo the indoxyl still in the fused state is dissolved in water, and air blown through to oxidise and condense the indoxyl to indigo; or the solution is acidified so as to give free indoxyl. which is then oxidised and condensed to indigo.

JELLY POWDER.

1200 K.B.S., Bombay—Wants to have good recipes of jelly powder.

Gelatin	14	lbs.
Sugar	85	„
Corn sugar	15	„
Cream of tartar	2 lbs. 6	„
Tartaric acid	1 lb. 8	oz.

Mix. To this mixture add the colouring and flavouring mixture of the flavour wanted. Direction for use:—Dissolve 3½ oz. of the jelly powder in ½ pint of boiling water, stir until dissolved. Add ½ pint of cold water. Stir, pour into mould and chill. If fruits, nuts, etc., are to be used, add them after the gelatin dessert is cold and set sufficiently to hold them in place. All fruits, with the exception of pine-apple, may be used either raw or cooked. Pineapple must be cooked first or the dessert will not set.

II.

Granulated sugar	3	lbs.
Gelatin, in coarse powder	7	oz.
Tartaric acid in powder	1½	dr.
Oil of lemon	1	„
Colour	sufficient	

Mix. Other varieties may be prepared by using the appropriate flavouring essence in place of the oil of lemon.

EAU-DE-COLOGNE.

1223 K.S., Malliakarai—wishes to have a formula of preparing eau-de-cologne.

Bergamot oil	1	oz.
Lemon oil	½	„
Rosemary oil	2	dr.
Neroli oil	30	drops.
Lavender oil	4	dr.
Orange oil	2	„
Rectified spirit	2	lbs.

Mix the ingredients with brisk shaking one by one. Set the whole aside in a stoppered vessel for 2 weeks and during that period shake the vessel thrice daily at a time, finally filter and pack.

ARTIFICIAL WOOD FROM SAWDUST.

1225 B.K.S., *Bangalore—Desires to know* a process of making artificial wood from saw dust.

Sawdust	20	parts.
Casein	1	part.
Sodium silicate 9 per cent solution	1	„

Mix all together until thoroughly homogeneous. Then pass into desired shape and size and dry in air.

RUBBER CLOTH.

1260 B.C., Coimbatore—Desires to know a process of making rubber cloth.

Concentrated latex	100	parts.
Whiting	50	„
Zinc oxide	3	„
Sulphur	2	„
Du Pont Accelerator	0.2	„
Casein solution (10 p.c.)	5	„
Water	15	„

Mix all the ingredients except latex with the water. Then dissolve this into the latex. Next apply this mixture uniformly over the cloth spread on a horizontal tablet. When dry vulcanise.

French chalk or barytes may be substituted for whiting, which serves to promote permeability to air as well as to cheapen the spreading mix. If more weight or a better handle is required the quantity can be increased, in which case it may be advisable to increase the quantities of water nd casein solution. Curing is effected by the addition of zinc oxide, sulphur, and accelerators under heat. If Du Font accelerator is taken, it is sufficient to run the fabric over a heating plate or cylinder heated to about 100°C—120°C. Vulcanisation of the mix sets in and continues at ordinary room temneratures.

With light weight fabrics it frequently happens that a light coloured mix is visible through the new material. This has the effect of causing an apparent change in the shade. In such cases suitable colouring agents should be added to the mix. When dealing with pure white cloths, it is possible to avoid discoloration by displacing 10 parts of whiting in the above mentioned mix, and substituting 20 parts of titanium dioxide along with a further 5 parts of 10 p.c. casein solution. Here the addition of a water soluble blue is also helpful to tint the mix slightly.

TONIC SYRUP.

1265 A.R.K., Bhagalpur—Wants to have formula and process of preparing tonic syrup.

Calcium hypophosphite	18.3	grms.
Hypophosphorous acid	2.5	"
Sucrose	800.0	c.c.
Distilled water to produce	1000	"

Dissolve the calcium hypophosphite with the aid of the hypophosphorous acid in 450 c.c. of distilled water, filter the solution, and the sucrose to the filtrate, and after this had been dissolved by agitation, add sufficient distilled water to make the product measure 1000 c.c.

MOSQUITO REPELLING OIL.

1275 R.P.V., Karachi—Wants to have a recipe of mosquito repelling oil.

Cedar oil	2	fl.oz.
Citronella oil	4	"
Spirit of Camphor	8	"

Just shake together in a dry bottle and it is ready for use. This preparation may be smeared on the skin as often as is necessary to repel mosquitoes and other insects.

ASTHMA MIXTURE.

Potassium Iodide	10	grains.
Ammonium carbonate	4	"
Tinct. Ipecac	15	mins.
Sp. Ether	15	"
Aqua chloroform	½	oz.

Mix. This is for one dose.

GOOD WASHING SOAP.

1283 G.C.S., Jubbulpore—Wishes to have a good formula of washing soap.

Coconut oil	51	parts.
Castor oil	9	"
Caustic soda lye 38°Be	23	"
Water	12	"
Silicate of soda	5	"

Heat the oils together in a capacious iron pan. When the mixture is moderately heated and begins to give off fumes pour the lye slowly with stirring. After the addition of the lye continue boiling for some time adding water from time to time so as to keep the mass soft. When the whole of the oil mixture has been saponified, which can be ascertained by dropping a little of the mass into a bottle of water.. If completely saponified the mass will sink to the bottom without spreading. At this stage add 12 parts of water in which 5 parts of silicate of soda have been dissolved. Put any desired colour in this mixture of silicate. Finally pour the soap into frames and keep aside for 24 hours. Then cut into blocks and press into cubes in a stamping machine.

MALT VINEGAR.

1312 K.D.G., Mhow—Wants to know process of making malt vinegar.

Bruise 200 parts of large raisins, 12½ parts crude tartar, and 100 parts of wheat malt, and work them to a stiff paste by adding hot water. Let this stand for half-an-hour, then pour 1800 to 2000 parts of hot water over it, and let it stand for 3 hours. Now pour it in a barrel provided with a faucet and standing near a warm stove. When the mixture is as warm as the hand will bear add 300 parts of yeast and stir thoroughly. After 3 hours, when all the yeast is fermented, add 400 parts of sharp wine-vinegar, let it stand for 24 hours, and then draw off the fluid. Remove the yeast and cleanse the barrel by rinsing it with water. Replace the fluid in the barrel, bung tightly, and let it stand quietly for 14 days, when the vinegar will be sour. After it has been laid for 6 weeks draw it off, and to improve the vinegar repeat the operation several times. Vinegar thus prepared is nearly equal to the best wine-vinegar.

TABLE VINEGAR.

Ginger	1	od.
Pimento	1	"
Long pepper	3	"
Black pepper	3	"
Mustard	8	"
Vinegar	8	pints.

Bruise the spices and simmer gently in the vinegar for ten minutes, cool and strain. The vinegar prepared in this way is used with any vegetable.

GUR REFINING.

1325 K.V.V., Madura—Desires to know a process of gur refining.

The ordinary gur consisting of a mixture of sugar crystals and molasses is put in earthenware conical vessels with perforations at the bottom. If, however, the proportion of molasses in the gur appears to be above the average it is advantageous to have a preliminary draining out of the molasses in split-bamboo baskets before putting the gur in the earthenware pots as aforesaid. In the case of a new pot, it is necessary to cover the perforations with a layer of crystalline gur in order to prevent the molasses passing out too quickly and carrying sugar crystals along with them, and then to fill it up with the gur as such. As the molasses has drained out as much as possible, which generally takes in the case of an average lot of gur 3 or 4 days, the contents of the pot are transferred to the centrifugal machine where-upon the molasses is removed and dry crystals of sugar are obtained It has been found advantageous to finish off the operation by spraying a little water on the crystals and centrifuging the lot for a few minutes more. The water dissolves the film of molasses clinging to the crystals and leaves through the pores charged with molasses. This wash ensures the removal of the last traces of the molasses and soluble impurities and thereby improving sugar produced. The molasses collecting below the percolation pot and in the other casing of the centrifugal machine is concentrated for further crystallisation in the usual manner, and the process is repeated as long as crystals are yielded.

PROCESSES OF GRINDING OF MICA.

1300 P.B.M.H., Birbhum—Desires to know the processes of grinding mica.

Mica is ground by two processes, known as dry grinding and wet grinding. Wet ground mica is the finer of the two.

DRY GRINDING PROCESS.

This is comparatively a simple process and is generally done by disintegrators. For this purpose Raymond pulverisers, Kek grinders, Buhr or Ball mills, Hammer mills or cage disintegrator type, fitted with screens of any desired mesh or with an air separator device fitted to them, are giving very good results. These screen pulverisers are considered as more efficient for dry grinding than any other special type of disintegrators.

The scrap is fed to the mill, when it is broken up. These are automatic arrangements to conduct the broken or ground mica to a series of vibrating screens of different meshes. The product is then screened and assorted in separate meshes. The oversizes that lie over the screens and conveyed back to the crushers, are reground. The disintegrators may also be accompanied with a cage mill consisting of two cages, one inside the other and rotating in opposite directions. The discharge of such mills is also classified by bolting. The oversize from the bolting machines is usually sold for decorative purposes.

WET GRINDING PROCESS.

If the scrap is dirty, it is to be washed, before grinding, in a trommel type of washer, removing the adhering dirt, mud and sand, etc., and making it grit-free and then it is dumped on a floor by a dewatering elevator. The cleaned mica is pulverised in 8 wet-grinding machines. They are of the non-continuous type each handling a charge of about 1000 pounds, which requires 24 to 30 hours for grinding. Each grinder works in a steel tank 4 feet deep and 10 feet in diameter. The bottom and sides are lined with wooden blocks placed on end. A vertical shaft with a 3 arm spider operates three 30-inch wooden rollers built up on planks. The vertical shaft rotates 10 or 12 revolutions per minute An automatic plow attached to an arm throws the charge from the circumference towards the centre. The finished charge has the consistency of mush, it will not flow but may be squeezed through the fingers. The mush is washed along a trough and is conveyed to a settling tank When partly settled, the water decanted from this tank carries with it rubbish, grease, and other impurities. The settled mica is dried over steam coils, disintegrated and passed to a 30 mesh sieve. What passes through, is again bolted through 140 mesh sieve and the finished product conveyed to bins or bags.

Another process is as follows:—

The grinding mechanism consists of tubs fitted with impellers for stirring the charge The impeller is a wooden disc that fits loosely within the cylinder. The cylinder is fitted with a clean scrap of mica and enough water is added to permit free motion of the charge. The impeller is then pressed down on the masses and started revolving. The friction of the disc churns the entire mass so that the mica is constantly being split and abraded by the mutual impact and friction of one part on another. The friction is so great that the water actually boils Grinding is slow, 8 hours being commonly required to grind a batch of 300 to 400 lbs.

Edge runner mills, constructed of wood, of larger capacity, are worked in several places, where the pans vary in size up to 10 ft. in diameter and 36 inches in depth, the wooden bottom being made with end grain blocks. 4 wooden rollers approximately 30 inches in diameter with 24 inches faces revolve round a central shaft These rollers are so arranged that they can be raised and lowered, depending upon the height of the charge in the mill. Washed mica scrap is placed in the mills, water is added and the rollers are lowered so that they are in contact with the charge. The rollers revolve at low speed and churn the mass until grinding is completed. The wet ground mica is sluiced from the grinding mill into the settling tanks, the supernatant water from one tank often being let to another, in which the finished mica is recovered. From the settling tanks, the wet mica is shovelled out and dried on steam tables, after which it is generally screened on 160 mesh. Oversize material is returned for further grinding, the undersize being packed for disposal. Improved methods include the replacement of the impeller by wooden rollers of the chaser types and replacement of wooden tubs by large circular steel tanks.

Wet-ground mica should have a high metallic lustre, should feel slippery and be free from grit and also mix freely and smoothly with liquid vehicles.

Brief Queries and Replies

3674 R.N.S., Allahabad—For manufacturing candles hard paraffin, wick and moulds are required. Hard paraffin is melted and poured into the moulds fitted with wicks. Candle moulding machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. Paraffin may be had of Burma Shell Oil Storage & Distributing Co., Ltd., Hongkong House. Dalhousie Square, Calcutta.

3677 K.L., Agra—We have no book dealing with the manufacturre of candles. You may see above No. 3674.

3680 H.S.T., Latpalndura — Holes in baloons are due to presence of our bubbles in the latex solution. Try to remove the air bubbles as much as possible. You may dip the mould thrice and not more than that.

3689 V.K.C., Kurnool—Refer your query to De Penning & De Penning, 10, Govt. Place East Calcutta and Remfry & son, Stephen House. Dalhousie Square, Calcutta.

3691 K.V.. Beawar—For hand driven pulveriser enquire of Prabartak Commercial Corporation Ltd., 61, Bowbazar Stree, Calcu . For knitting machines enquire of W. H. Brady & Co., Ltd., Churchgate Street, Fort, Bombay.

3692 R.S.S., Lucknow—It is very difficult for a non-matric to obtain apprenticeship training. It is advisable for you to join any local shop as an assistant.

3693 H.S., Bombay—Formulas of hydraulic brake fluid, motor grease, motor polish, etc.. will appear in an early issue of Industry.

3699 H.C.C., Muzaffarpur—Following is a formula of chalk stick: China clay 4 parts; plaster of paris 8 parts; precipitated chalk 4 parts; water q.s. Mix all the ingredients thoroughly and make a paste by adding sufficient water.

3700 S.M.V.G., Chittoor—Process of manufacturing rose water and essence by indigenous method will be found in "Indian Perfumes, Essences and Hair Oils" published from this office, price Rs. 3-6 including postage.

3704 O.S., Allahabad—Process of silvering glass, electric sparkler, etc., will appear in an early issue of Industry.

3707 M.M.P., Udaipur—The process of paper pulp making has appeared elsewhere in this issue and that on manufacturing toys from paper pulp appeared in April 1947 issue of Industry.

3712 T.P.. Trichur—For manufacturing condensed milk a portion of the cream is taken from the milk then it is boiled in vacuum pan. Detailed process will be found in Milk and Milk Products published from this office, price Rs. 3-6 including postage.

3713 G.L., Hyderabad—For tamarind seed decorticating and grinding machine you may enquire of Balmer Lawrie & Co.. Ltd.. 103, Netaji Subhas Road and Marshall Sons & Co.. Ltd., 99, Netaji Subhas Road; both of Calcutta. This may be used as sizing material.

3717 R.C.M.S.. Hoshiarpur—Following is a list of India Government Trade Commissioners in foreign countries. In U.K., India Govt. Trade Commissioner, India House, Aldwych, London, W.C.2; In U.S.A.. India Govt. Trade Commissioner. 630, Fifth Avenue, New York; at Buenos Aires, Avenide Roque Soanx Pena, 621 Buenos Aires; at Toranto, Royal Bank Bldg., Toronto; at Sydney, Prudential Bldg., Martin Place, Sydney; at Mombasa, Africa House, Kilindini Road, Post Box No. 614, Mombasa; at Alexandria, Al Bashir Bldg., No. 5, Rue Adib Bey Issac. Avenue dela Reine Nazli, Alexandria; at Colombo, Australia Bldgs., Fort, Colombo and at Paris, 31, Rue de Banne, Paris VIII.C. Following is a recipe of bindi: Carmine 5 parts; gum arabic 8 parts; water 10 parts. Dissolve the gum in cold water and incorporate carmine.

3718 B.N.M., Puri—Questions are replied by post on receipt of 8 annas postage stamps for each question.

3719 H.D.N.B., Bombay—Process of manufacturing ink for writing on metal will appear in an early issue of Industry.

3721 M.N.. Kurnool—We have no such book you may however enquire of Thacker Spink & Co. (1933), Ltd., 3, Esplanade East, Calcutta. For foreign journals you may enquire of International Book House, Ash Lane. Opp. Clock Tower, Bombay.

3722 S.S.S., Guntur—Process of fountain pen manufacture will be found in Mechanical Industries published from this office, price Rs. 3-6 including postage. We are not aware any firm in foreign countries that will manufacture fountain pen under your brand. For arms and ammunition you may enquire of R. B. Rodda & Co., Ltd., 2, Wellesley Place, Calcutta. For photographic materials enquire of Calcutta Photographic Stores & Agency Co.. Ltd., 154, Dharamtala Street, Calcutta.

3724 R.K.J., Rampur State—A formula of nitrocellulose lacquer will appear in an early issue of Industry.

3725 B.J.. Chhindwara—For drums enquire of M. L. Dey & Co., 14-2. Old China Bazar St., Caucutta; Metal Products & Engineering Co., 124, Harrison Road. Calcutta and Standard Drum & Bucket Factory, 232, Bellasis Road, Byculla, Bombay.

3735 S.V., Lucknow—Following is a formula of hair removing cream: Barium sulphide 4 oz.; petrolatum 30 oz.; spermaceti 10 oz.; Stearin 7 oz.; iodine 1½ oz.; potassium car-

bonate 1½ oz.; water 40 oz.; lavender or citronella oil 1 oz. Melt the petrolatum spermaceti and stearin over water and stir into potassium carbonate dissolved in the water. Then incorporate the barium sulphide, tinc. iodine and essential oil

3737 G.P.K., Silchar—You may negotiate with Francis Klein & Co., Ltd., 1, Royal Exchange Place; Volkart Bros., 8, Netaji Subhas Road and Marshall Sons & Co., Ltd.. 99, Netaji Subhas Road; all of Calcutta for paper mill installation. You have to invest at least Rs. 30 to 40 lakhs for starting a paper mill.

3738 W.C.L., Bombay—Process of manufacturing emery paper and sand paper will appear in an early issue of Industry.

3747 M.K.M., Ghaziabad—Printing on tin is done by lithographic process. It is not possible to do this on a small scale with small machine. For tin cans enquire of Tin Can Manufacturing Co., Qutab Road, Delhi; National Tin Manufacturing Works Ltd., Bellangunj, Agra and Tin Printing & Metal Works Ltd., Subji Mandi. Birla Lines, Delhi.

3748 M.I., Changanacherry—Refer your query to the Britania Engineering Co., Ltd., Titagarh. 24-Parganas.

3751 H.S.S., Jharia—Following is a list of sodium silicate factories: Calcutta Glass Silicate Works, 9, Kundu Lane, Calcutta; Eastern Soap & Silicate Works. 241, Manicktala Main Road, Calcutta; Hanuman Glass & Silicate Works. Kishanganj, Purnea; Punjab Silicate Works, 28, Bagmari Road, Calcutta; Shewbuxrai Rameshwarlall, 26, Bartolla Street, Calcutta and Sree Durga Silicate of Soda Factory, Chirkunda, Manbhum. For particulars write direct to the above firms.

3753 S.C., Hyderabad—For hat making materials enquire of Umar Farooque, 21, Nilmoni Haldar Lane, Dharamtala, Calcutta; Sk. Kamaruddin & Sons, D-63, Hogg Market, Calcutta and Sk. Nazir Ahmed, 10, Nilmoni Halder Lane, Dharamtolla, Calcutta.

3762 S.C.S., Allahabad—Formula of special kind of fountain pen ink will appear in an early issue of Industry.

3766 S.V., Lucknow—A good recipe of hair removing cream appears under No. 3735 above. Other formulas will appear in an early issue of Industry.

3773 M.C.D., Bombay—You may heat the water in water bath or steam. For waterbath contrivance enquire of Scientific Instrument Co. Ltd., 11, Esplanade East. Calcutta and Scientific Supplies (Bengal) Co., C39, College Street Market. Calcutta.

3778 S.J.T., Dwarka—Process of mirror making will be found in Independent Careers for the Young published from this office, price Rs. 3/6/- including postage. You may consult Manufacture of Soap published from this office price Rs. 3/6/- including postage. We have no book on potato and onion preserving.

3780 S.A.M.P., No address—You may start a washing soap factory with Rs. 10,000/-.

3783 K.L.D.. Bombay—A good formula of polishing bar will appear in an early issue of *Industry.*

3784 H.C.. Navsari—Process of silvering mirror appeared in May 1947 issue of Industry.

3788 B.R., Delhi—Following is a list of thread ball factory at Delhi: M. Farooq M Yahya. Sadar Bazar; S. H. Md. Shafi Md Khalal, Sadar Bazar and Kinglal Sital Pershad Oswal, Sadar Bazar. For candle and thread ball making machines enquire of Oriental Machinery Supplying Agency Ltd.. P12, Mission Row Extension, Calcutta.

3790 H.K.. Chaibasa—You perhaps mean dye soap. Dye soap is prepared by taking 1 lb of common white or coloured yellow soap, mixing with it. aniline dye 1 dr. and dissolving it in 2 oz. of gin and 2 oz. of water. then working up the mass in a clear paste and moulding it to the desired shape with stamps on. For starting a soap factory you need not take any special permission. Exhausted dry cell cannot be recharged.

3792 A.K.B., Benares—Formulas of tara alta and nail polish appeared in January 1949 issue of Industry. Process of manufacturing sulphuric acid appeared in July 1948 issue of Industry. For plants enquire of Chemical Plant & Equipment Ltd., 7, Lower Chitpur Road Calcutta.

3799 K.P.M.T.F., *Negapatam*—For pug mill and tile making machines enquire of Oriental Machinery Supplying Agency Ltd.. P12, Mission Row Extension. Calcutta and Burn & Co. 12 Mission Row, Calcutta.

3802 G.S.. Chakhar—For revivifying used animal charcoal you treat with weak caustic soda solution.

3804 B.N.D,. Katwa—You may stock insect powder and other chemicals without license.

3805 B.K.M.. Mysore—For laundry machines worked by electricity enquire of Radio Supply Ltd., 3. Dalhousie Square. Calcutta and Jessop & Co. Ltd., 93 Netaji Subhas Road Calcutta. Other particulars required will be supplied by the above firms.

3808 K.A.V.A., Kandy—It is not possible to whiten catechu without affecting its medicinal properties.

3815 H.C.R., Shikarpur—Sodium carbonate is washing soda which is used in washing clothes.

3820 P.T.T., Bombay—Formulas of gilding, lacquering and drilling glass will appear in an early issue of Industry.

3822 K.P.H., Gorakhpur—For particular write to Amrit Banaspati Co. Ltd., Ghaziabad and Modi Vanaspati Manufacturing Co., Modinagar.

3824 N.R.V.S., Mandla—Following is a list of farms and ammunition dealers: A. C. Coondoo & Co. Ltd., 170, Dharamtala Strtet, Calcutta; Manton & Co. Ltd., 13, Old Court House Street. Calcutta; Goolamhusain Allibhoy & Son Ltd., 210 Abdul Rehman Street, Bombay and R. B. Rodda & Co. Ltd., 2. Wellesley Place, Calcutta. Following is a formula of gun powder: Potassium nitrate 75 parts; charcoal 15 parts; sulphur 10 parts. Finally powdered the ingredients then mix thoroughly.

3825 S.T.C., Delhi—Conduit pipes may be had of Calcutta Conduits, 6, Kali Krishna Tagore Street. Calcutta and Indian Conduit Industries, Panipat. For plastic sheets enquire of Dodge & Seymour (India) Ltd., P21, Mission Row Extension, Calcutta. Carnauba wax may be had of Calcutta Chemical Co. Ltd.. 5, Bonfield Lane, Calcutta. For printed tin cans enquire of Metal Box Co. of India Ltd., B2, Hide Road, Kidderpur, Calcutta and Bengal Tin Box Manufacturing Co. Ltd.. 1, Jadu Nath Mitter Lane, Calcutta 4. Formula of boot polish will be found in Prospentive Industries published from this office, price Rs. 3/6/- including postage.

3827 G.T., Madras—Process of manufacturing white flour will appear in an early issue of Industry.

3831 N.J.V.C., Murtazapur—Recipes of malaria mixture and a ague mixture will be found in Pharmaceutical Preparations published from this office, price Rs. 3/6/- including postage. For pharmaceutical chemicals enquire of Continental Drug Stores, Damodar Bldg., 115, Princess Street, Bombay, and Standard Pharmacy, Ashok Bldg., Princess Street, Bombay.

3835 A.F.B., Bombay—Following is a process of making perfumed betelnut chips: Pulverise several betelnuts. Then mix with sufficient quantity of glycerine so as to moisten the powder. Next add a little pink colour which should of course be harmless. Lastly add a small amount of menthol, eucalyptus oil, etc., to perfume the substance as delicately as possible.

3837 S.S., Nagpur City—Process of manufacturing Vanaspati is highly technical and elaborate one. So this cannot be described in these columns. Process however will be found in Vegetable Oil Industry published from this office, price Rs. 3/6/- including postage.

3838 K.P.. Hardwar—Tannic and gallic acids may be had of Calcutta Chemical Co. Ltd., 5, Bonfield Lane, Calcutta. Dyes may be had of Champalal Agarwala, 45, Armenian Street, Calcutta.

3842 R.S., Agra—No stamp is required for publishing replies of query letters in these columns.

3847 G.S., Amritsar—In place of Molda you may use starch obtained from grinding tamarind seeds.

3853 M.R., Bangalore City—A good formula of snow will be found in October 1948 issue of Industry.

3854 K., Lahore—A good formula of phenyle appeared in July 1947 issue of Industry.

3855 A.A., Bhopal—To prepare sand papers use glue of the highest attainable viscosity. Coat strong paper with glue and pass it between rollers which keep a rather concentrated solution of glue to the surface of the paper. Then sprinkle profusely glass powder of the selected size of grain upon it, shake off the excess and pass the paper slowly along a second set of rollers, which it reaches in about half an hour. In passing through this second set it is again treated with a layer of the same glue but of a weaker concentration which binds the glass powder firmly that may not easily fall off. The paper is then passed slowly over heated pipes for about an hour and then wound into rolls or cut to appropriate sizes.

3866 K.S.T., Rameswaram—Process of extracting ilmenite will appear in an early issue of Industry.

3874 K.G.G., Lucknow—Moist the camphor powder with alcohol then make plate with pressure.

3877 R.I.. Adoni—Process of manufacturing chocolate will be found in Manufacture of Confectionery published from this office, price Rs. 3/6/- including postage. Ingredients for making chocolate may be had of Rajaram & Co.. 37, Grant St., Calcutta.

3878 G.S.S.. Madras—A formula of black enamel will appear in an early issue of Industry.

3881 G.B., Kanpur—After adding creosote oil boil for some time and stir vigorously when the defect will be removed.

3882 R.G.S., Jiaganj—Following is a formula of washing soap: Cocount oil 24 lbs.; Castor oil 10 lbs.; Caustic soda lye 37°Be 22 lbs.; Silicate of soda 20 lbs.; Metanil yellow 15 grains. Heat the oils in a capacious iron vessel till these are bearably hot. Now little by little add the lye while stirring. Let the fire burn slowly. When the soap begins to ferment and threaten to overflow put out the fire altogether. Let it stand for a few minutes. Then boil the whole until saponification is complete. Now pour into it silicate and 4 lbs. of water in which colour has been dissolved hot stir it well. When the soap becomes homogeneous, mix the perfume as desired and pour it into frames.

3892 K.S.T., Rameswaram—We are not aware of rutile and its uses.

3893 P.L.G., Ghaziabad—Refer your query to the Director of Industries, U.P., Kanpur.

3894 R.N.G., Calcutta—Following is a list of general merchants of Colombo: Dodwell & Co. Ltd., P.O. Box 47, Colombo; R. Rustomji & Co. Ltd.. 98, Grandpass Road, Colombo; Dunber Bros. (Ceylon) Ltd., P.O, Box 750, Colombo and Chettinad Corporation Ltd., 116/118, Keyzer Street, Colombo. It will be advisable for you to advertise through advertising agents such as Ideal Advertising Agency, 54. College Street; D. J. Keymer & Co. Ltd., 5. Council House Street and Metro's Publicity Sales & Service Ltd., 10, Clive Row, all of Calcutta. Regarding import license write to Deputy Controller of Imports, Customs House, Calcutta.

3896 S., Bareilly—To communicate with any querist write to him with number and initials care of Industry when your letter will be redirected. Your other queries are not in our line.

3899 G.V.R., Hapur—Formulas of bottle caps will appear in an early issue of Industry.

3907 S.D.S., Khandwa—You perhaps mean bluing gun barrels. The bluing gun barrels is effected by heating evenly in a muffle furnace until the desired blue colour is raised, the barrel being first made clean and bright with emery cloth, leaving no marks of grease or dirt upon the metal when the bluing takes place, and then allow to cool in the air. It requires considerable exprience to obtain an even clear blue.

3911 R.C.V., Morvi—A formula of washing soap appears under No. 3882 above.

3913 H.R.P., Wardha—Following is a formula of candle: Hard paraffin 30 oz.; stearic acid 17½ oz.; beeswax 2½ oz. Melt together and stir until clear. If coloured candles are desired a pinch of any oil soluble dye is dissolved at this stage. Pour into the moulds set with wicks. Following is a formula of chalk sticks. Precipitated chalk 8 oz.; china clay 5½ oz.; oleic acid 6½ oz.; caustic soda 1 oz.; water q.s. Mix the oleic acid and caustic soda after warming them separately. Then add to the clay and chalk mixed with enough water to bring to about the consistency of putty. The mixing must be done in a standard type dough mixer or other clay mixing equipment. Then cast into sticks of the usual size and bake over moderate heat. A formula of washing soap appears under No. 3882 above.

3916 K.S., Mhow—Formulas of malt vinegar, table vinegar, blue black ink, etc., will appear in an early issue of Industry.

3918 M.C., Multan—Process of manufacturing dyes will be found in the Synthetic Dye Stuffs by J. C. Cain and J. F. Thorpe. Following is a recipe of depilatory powder: Barium sulphide 20 grams; soap powder 5 grams; powdered talc 32 grams; wheat flour 32 grams; benzaldehyde sufficient to perfume.

3919 I.C.M.C., Bhadohi—Camphor is generally obtained from a species of tree found chiefly in the Island of Formosa. To extract camphor the wood is cut into small pieces and boiled with water in iron vessels which are covered with large earthen domes, lined with rice-straw. As the water boils, the camphor is volatilised along with the steam and condenses in straw. The crude product is next purified. For this purpose 100 parts of crude camphor are mixed with 2 parts each of quicklime and charcoal and the mixture is put in a glass vessel placed over a sand-bath. The heat is then continuously applied, the camphor is sublimed off and deposited on the upper part of the vessel When the process is complete. the vessel is removed and allowed to cool. Process of manufacturing methylated spirit will be found in Industrial Alcohol. Its Production and Use by J. C. McIntosh.

3726 R.G., Ahmednagar—Following is a formula of electric sparklers: Powdered sulphur 1 oz.; potassium nitrate 5 oz.; powdered charcoal 1½ oz.; Iron filings 2 oz.; aluminium powder ½ oz.; shellac borax solution q.s. Mix the solid ingredients and then make a thick creamy consistency with sufficient shellac borax solution (prepared by dissolving shellac 4 parts, borax ½ part and water 10 parts). Now dip the wires in the mixture, and then insert the base of the wires in holes drilled into board until mixture dries. Repeat this process until each wire is covered with a thick coat. Hints regarding *manufacture of coloured matches* will be found in Safety Matches and Their Manufacture published *from this office*.

3927 H.K.M., Srinagar—For the chemical you require, enquire of Calcutta Chemical Co., Ltd., 5, Bonfield Lane, Calcutta and Allied Agency. 16, Bonfield Lane, Calcutta.

3930 N.F.C., Ambala City—6 grms of ghee are dissolved in 5 c.c. petroleum ether and shaken for half a minute with 0.1 c.c. of a fresh, 1 p.c. alcoholic furfurol solution, and [illegible] c.c. conc. hydrochloric acid. Above 1 p.c. sesame oil can be detected by the red coloration of the acid layer. Sometimes even 0.5 p.c. sesame oil is recognisable by a rosy colour of the said layer. In the absence of sesame oil, a yellow or at most a brown-yellow colour is formed.

3932 S.B.C., Howrah—You may cover [illegible] with gold or silver leaves available in the market. These are better known as tabak and are used by sweetmeat dealers for covering sandesh, etc.

3937 B.G.I.. Bettiah—You have to take license for stocking poisonous drugs, otherwise you need not take license.

2947 K.C.P., Indore—Gum and lac are exported to U.K. and U.S.A. For particulars

write to Indian Trade Commissioner, India House, Aldwych, London W.C.2 and Consul General of India in New York, 630, Fifth Avenue. New York, U.S.A.

3948 K.Y.B., Lahore—Following is a formula of sole polish: Melt 1 part stearin in an iron pot over slow fire; remove the pot and place it in another room or in the open air, and 4 or 5 parts of benzine; stirring vigorously. Paint the soles with this mixture and polish with a linen rag.

3955 K.S.T., Rameswaram—Process of separating rutile from soil follows: Fuse rutile with three times of its weight of potassium carbonate. The fused mass is then lexiviated with water whereby the insoluble titanium dioxide is separated out from soluble matter.

3962 U.M.P., Surat—Following is a formula of soft soap: Linseed oil 1000 parts; water 150 parts; potash lye (25°Be) 850 parts; soda lye (25°Be) 350 parts. Following is a formula of sizing oil. White oleic acid 41 lbs.; denatured alcohol 31 lbs.; caustic potash (48°Be) 17½ lbs. Mix these three thoroughly and test for neutrality. Make exactly neutral then add water 4 lbs.; white mineral oil 854 lbs.; white oleic acid 35 lbs. Add the free oleic acid gradually with constant stirring, until the entire liquid becomes clear. This may require slightly more oleic acid than listed. When clear add 11 lbs. steam-distilled pine oil.

3963 N.R., Secunderabad—Following is a formula of depilatory cream: Barium sulphide 4 oz.; petrolatum 30 oz.; spermaceti 10 oz.; stearine 7 oz.; tincture iodine 1½ oz.; potassium carbonate 1¼ oz.; water 40 oz.; lavender or citronella oil 1 oz. Melt the petrolatum, spermaceti and stearin over water and stir into it potassium carbonate dissolved in the water. Then incorporate the barium sulphide. tinc. iodine and essential oil. Following is a formula of depilatory soap: Soap base 2 seers; white starch 1 seer; barium sulphide 2 seers. Soap base should be in pasty form. Incorporate the other two ingredients in fine powder. Mix intimately to have uniform mass and mould.

3967 K.L.S., Rajmahal—For tin can making machines enquire of Alfred Herbert (India) Ltd., 13-3, Strand Road, Calcutta. The firm will supply you with estimate for starting a factory with their machines.

3968 R.P.T., Palamau—There is no arrangement for learning this industry and cork industry. Double boiled linseed oil is used in manufacturing paints and varnishes. Oil cakes are used as manure and fodder for cattle.

3974 K.R.K.R., Samalkot—A few pieces of commercial granulated zinc is to be placed in two necked glass bottle through one neck of which is inserted a long stemed thistle funnel through a cork while a bent glass delivery tube is similarly inserted through the other. The stem of the funnel should be just above the bottom of the bottle but the delivery tube should terminate just within the neck of it. A small amount distilled water (only one tea spoonful) is introduced through the funnel and then dilute sulphuric acid is slowly added when hydrogen gas will evolve and come out through the open end of the delivery tube. This gas may be collected in a vessel over water and pumped into a metal or stone vessel under pressure. This may then be kept for ready use. On opening the valve, the gas under pressure will enter the rubber balloon and force its way within thereby causing it to equal. For the vessels you may enquire at (1) Scientific Instrument Co., Allahabad; (2) Adair Dutt & Co. Ltd., Stephen House, Calcutta and for the chemicals write to Scientific Supplies (Bengal) Co., College St. Market, Calcutta. No book is available on paper toy and decoration of Chinese or Japanese pattern.

3977 B.M.S.B., Bombay—Process of manufacturing all kinds of soap will be found in Manufacture of Soap published from this office, price Rs. 3/6/- including postage.

3978 D.P.S., Bhavnagar—Ink making materials may be had of Hansraj Vishram & Co., 2A, Armenian Street, Calcutta; Rainbow Colour Co., 2-2A, Armenian Strerет, Calcutta; National Aniline & Chemical Co., (U.S.A.), Patel House, Churchgate Street, Fort, Bombay and Ambaprasad Jadavjee & Co., Tobacco Katra, Delhi.

3983 V.P., Kurtha—For bucket manufacture you require sheet metal working machines which may be had of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta. We have no book on bucket Manufacture. For making candles melt hard paraffin and pour it in moulds fitted with wick. For glass bangle factory you require a furnace.

3984 P.S., Dacca—Following is the process of manufacturing Sen Sen: Extract of liquorice 1 oz.; refined sugar ¼ oz.; menthol 5 grains; otto of rose according to taste and essence of musk according to taste. Grind extract of liquorice into fine powder, then mix it with sugar and finally add menthol and make into small cubes. Otto of rose and essence of musk are to be taken in suitable quantities Kesarbilas and elachidana being proprietory articles their formulas are not available. Refer your query regarding coconut tree to Director of Agriculture of your Province.

3990 S.R.M., Bijapur—Following is a list of major industries of India: Cotton textiles, jute, iron and steel, coal, cement, paper. chemical, non-ferrous metal industries, oil, cotton pressing and ginning, etc. For particulars enquire of Industries Department of your Province.

3992 J.D., Wordha—Following is a formula of candle: Hard paraffin 30 oz.; stearic acid 17½ oz.; beeswax 2½ oz.; Melt together and stir until clear. If coloured candles are desired a pinch of any oil soluble dye is dissolved at this stage. Pour into vertical moulds in which wicks are hung.

3998 J.S., Ahmedabad—For paint grinding and mixing machine enquire of Volkart Bros., 8, Netaji Subhas Road, Calcutta and Marshall Sons & Co. Ltd., 99, Netaji Subhas Road, Calcutta. We have no book on paint and varnish manufacture.

4000 G.S., Jhansi—Process of manufacturing cigarette lighter stones will appear in an early issue of Industry.

4001 S.K.S., Patna—For starting a glass bangle factory you should appoint an expert who will advise you for starting a glass bangle factory.

4004 G.L.S., Darjeeling—For preserving ghee for lungs you should boil the butter thoroughly so that no watery portion of butter remains after boiling.

4006 A.G., Samalkot—Glass bangle manufacture is profitable. Process of manufacturing glass bangles will appear in an early issue of Industry.

4008 B.S.B.P., Patna—For selling casein you may negotiate with the following firms: Bengal Plywood Industries, 38A, Belgachia Road, Calcutta; Plywood Manufacturing Co., 108, Prince Anwar Shah Road, and Chasma Plywood Products, 17, Phulbagan Road, P.O. Entally, all of Calcutta.

4015 V.C., Kunnakulam—Dissolve waste celluloid in methylacetate and acetone and make bangles of desired design.

4016 S.M.H., Ludhiana—Chemicals mentioned by you are used in medicine. For detailed information consult a hand book on chemistry.

4029 B.L.K., Kartarpur—Process of bleaching indigosol colour fast will appear in an early issue of Industry.

4031 C.K.M., Rabkavi—Process of manufacturing rubber stamp will be found in Manufacture of Rubber Goods published from this office, price Rs. 3/6/- including postage. Process of manufacturing P.O.P. will appear in usual course.

4033 M.C., Agra—Following is a formula of lubricating grease: Tallow 25 lbs. mobil oil 70 lbs.; caustic soda lye 40½Be 10 lbs. Melt the tallow over fire and add the caustic lye. Boil to saponification. Then incorporate the mobil oil and keep aside to cool. Following is a formula of phenyle: Rosin 85 lbs.; castor oil 20 lbs.; caustic soda lye 30Be 60 lbs.; light creosote oil 100 lbs. Melt the rosin, add the castor oil and when thoroughly incorporated and while the mixture is still warm add the caustic soda lye and boil until the whole is saponified. Add a quantity of water from time to time if required. Lastly dissolve the soap thus formed with 3 to 4 times its volume of water and allow to cool. When nearly cold add the creosote and stir. This gives the disinfecting fluid of good quality.

4036 H.C.R.K., Ludhiana—We have no book on duplicator manufacture. Following is a formula of composition for duplicator: Gelatine 3 lbs.; water 13 lbs.; gycerine 18 lbs., barium sulphate 7½ lbs.; sugar 3 lbs.. Cut the gelatin in small pieces and soak for 12 hours in the water, then add the glycerine. Heat gently on a waterbath to effect solution and then incorporate barium sulphate and sugar thoroughly. Lastly pour into a suitable rectangular tin box. Methyl violet is usually used in making ink.

4038 S.R.D., Silchar—We have no book on glass manufacture. Glass making furnace may be had of Francis Klein & Co. Ltd 1, Royal Exchange Place, Calcutta. Raw materials for glass manufacture may be had of Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane, Calcutta.

4039 T.B., Calcutta—Process of manufacturing lozenge will be found in Manufacture of Confectionery, published from this office, Rs. 3-6 including postage. For machines and other equipment enquire of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

4045 R.V., Poona—Formulas of all sorts of ink will be found in Manufacture of Ink published from this office. Other formulas you require will appear in due course.

4047 O.R.C., Madanapalle—Cured tobacco has no harmful effect upon health. Process of curing tobacco will be found in Indian Tobacco and Its Preparations which you have already got.

4049 P.S.M., Tundi—You may consult Home Industries published from this office, price Rs. 3/6/- including postage.

4053 D.A.C.W., Bhagalpur—A formula of scented coconut oil will be found in September, 1948 issue of Industry. Process of manufacturing Amla oil appeared in June 1948 issue of Industry.

4054 L.A., Ahmedabad—An article on plastic industry appeared in December 1948 issue of Industry. There is no arrangement for teaching lens grinding and drilling. You may however try to be an apprentice in lens grinding firm.

4055 J.S.M., Balaghat—Formulas of cold cream and vanishing cream will be found in Manufacture of Toilet Goods published from this office. Better formula of pain balm than that which you have already got is not known at present. However if we come across any good formula we shall publish this in these columns.

4056 R.S.T., Bellary—Process of manufacturing condensed milk will be found in Milk & Milk Products published from this office, price Rs. 3/6/- including postage.

4061 Z.C.W., Madras—A good formula of washing soap appeared in September 1948 issue of Industry.

4063 R.C., Amritsar—Process of manufacturing liniment terebinth B.P. and other medicine will appear in due course.

4064 K.S.S., Delhi—There is no arrangement for practical experiment of magic ink. For chemicals you may enquire of Calcutta Chemical Co. Ltd., 5, Bonfield Lane, Calcutta and B.K. Paul & Co. Ltd., 1 & 3, Bonfield Lane, Calcutta.

4065 M.R.L., Jodhpur—Grind the lump in powder then separate the grit by means of sieving or by flotation process. Pour the powdered stone in water and stir vigorously when sand and grit will settle at the bottom, now decant the water and let it settle when the stone powder will settle at tht bottom. Decant the clear water and dry the sediment settled at the bottom. Now finely grind the dried lump.

4067 M.B., Calcutta—Mahabhringaraj hair oil is an ayurvedic preparation which may be found in any book on ayurvedic medicine preparation.

4070 A.B., Bombay—Formulas of sauces, phenyle, etc., will appear in an early issue of Industry.

4073 K.A.P., Partur—Process of manufacturing catechu will be found in Manufacture of Catechu published from this office, price Rs. 3/6/- including postage.

4074 A.A., Dacca—You may start soap manufacture and phenyle manufacture with Rs. 8,000/.

4084 K.S.A., Nasik—All the formulas you require will be found in Manufacture of Toilet Goods, Pharmaceutical Preparations and Prospective Industries, all the books published from this office.

4085 S.K.P., Bombay—Following is a formula of ultramarine blue: China clay 100 parts; sulphate of soda 41 parts; carbonate of soada 41 parts; carbon 17 parts, sulphur 13 parts, sulphite of soda 26 parts. Take the ingredients free from iron and grind fine. Next heat in a muffle furnace in closed pots. This produces white ultramarine and turns blue on exposure to air for some time. The latter is mixed with 4 per cent. sulphur and roasted in shallow pans, must be well stirred.

4097 C.B.T., Champaran—Process of manufacturing essences from flowers will be found in Indian Perfumes, Essences and Hair Oils published from this office, price Rs. 3/6/- including postage.

4101 V.M.D.P., Tanjore—Soap manufactured with Mohua oil will be of cream colour and not white. If you manufacture soap with neem oil you have to salt out the soap. at least twice to remove the objectionable odour of neem oil.

4102 T.S., Cocanada—An article on sago manufacture from tapioca will appear in an early issue of Industry.

4106 S.N.N., Ranchi—For white oil enquire of Victor Oil Co., 14, Netajee Subhas Road, Calcutta. You may start a soap factory with Rs. 5,000/- as initial capital. A formula of washing soap appeared in September 1948 issue of Industry.

4108 T.V.V., Tirunelveli—For laundry machine enquire of Radio Supply Stores Ltd., 3. Dalhousie Square, Calcutta. The above firm will supply you with detailed information regarding laundry industry.

4110 S.B.S.S., Mysore—Arsenic in the form of Arsenious oxide is the chief impurity in sulphuric acid. Arsenic may be removed from sulphuric acid by treating the acid with sulphureted hydrogen and precipitating the arsenic as sulphide. On the large scale the acid is diluted to 45°Be and allowed to flow down leaden towers against an uprising stream of sulphunetted hydrogen. Thus purified sulphuric acid should be so diluted that its specific gravity should be 1.22.

4117 I.C.K., Surat—Process of delusturing artificial silk will appear in due course.

4119 M.A., Karachi—You perhaps mean waxed paper. Waxed paper is made by passing it through a bath of melted wax at a high temperature, any excess being removed by squeezing rolls through which the hot waxed paper is passed. The paper is led over skeleton drums and thoroughly cooled before being cut into sheets. Chemicals you require may be had of Calcutta Chemical Co. Ltd.. 5, Bonfield Lane, Calcutta.

4120 B.L.S.C.J., Alwar—Process of manufacturing distilled water and battery solution appeared in January 1948 issue of Industry. Following is a recipe of hydraulic brake fluid. Ethyl acetate 33 parts; castor oil 2 parts. Mix. Following is a formula of grease: Tallow 25 parts; mobil oil 70 parts; caustic soda lye 40° 10 parts. Melt the tallow over fire and add the caustic lye.. Boil to saponificataion. Then incorporate the mobil oil and keep aside to cool.

4121 B.C.W., Poona—You may put any question on industrial line.

4129 S.R.M., Kumbakonam—Process of manufacturing electric pin wheel, electric gerb, etc., will appear in due course.

4130 A.R., Agra—Following is a formula of soft soap: Linseed oil 1000 parts; water 150 parts; caustic potash lye 25°Be 850 parts; caustic soda lye 25°Be 350 parts. Following is a formula of sole polish; soft soap 2 parts; linseed oil 3 parts; annatto solution (in oil) 8 parts; beeswax 3 parts; turpentine 8 parts; water 8 parts. Dissolve the soap in the water and add the annatto: melt the wax in the oil and turpentine, and gradually stir in the soap solution, stirring until cold.

4131 B.C., Bombay—Process of manufacturing cement appeared in October 1947, issue of Industry.

4133 P.T.P., Ambasamudram—Formulas of lime squash and artificial squash appeared in January, 1949, issue of Industry. Detailed information on fruit juice preparations will be be found in All About Fruits published from this office, price Rs. 4/6/- including postage.

4136 N.B.S., Bezwada—A formula of face powder appeared in December, 1948, issue of Industry.

4139 J.N.F.C., Ambala City — Shellac is soluble in borax solution.

4142 N.B.C., Bezwada. See under No. 4136.

4146 B.I.L., Bherhampur — Process of manufacturing all sorts of ink will be found in Manufacture of Inks published from this office, price Rs. 3/6/- including postage. You may also consult Indian Perfumes, Essences and Hair Oils, price Rs. 3/6/-.

4151 S.R.M., Kumbakonam—Process of manufacturing borneol crystal will appear in an early issue of Industry. Formulas of rotating wheel appeared in November, 1948, issue of Industry.

4135 R.J.P., Visapur Camp—A recipe of ringworm ointment appeared in December, 1948 issue of Industry. A recipe of skin ointment will be found in November, 1948 issue of Industry. A recipe of nail polish appeared in June, 1948 issue of Industry.

4159 R.C.P.S., Hoshiarpur—All the recipes you require will be found in Pharmaaceutical Preparations published from this office, price Rs. 3/6/- including postage. For preparing scented bindi in power from take imitation vermillion 5 parts; red lead 1 part and liquid musk 1/16 part. Mix thoroughly.

4163 H.B., Jamshedpur—You may start a foundry as suggested by you. For securing an expert you should advertise in newspapers. For machineries enquire of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta. Process of wirenail making will be found in Mechanical Industries published from this office, price Rs. 3/6/- including postage.

4174 B.P.S.S., Amritsar—You may use any kind of starch in place of moida flour.

4179 O.S.M.L., Hargaon—The modern sugar factories were started from the beginning of of the 20th century. In 1919-20 the number of modern factories was 19, but the number began to increase slowly and in 1934-35 number of factories increased to 155. In the year 1931-32 there were 14 factories in U. P. and 12 factories in Bihar & Orissa but during the 1934-35 U. P. had 75 factories and Bihar 37 factories.

4180 S.B.M., Bankura—A good formula of washing soap will be found in September, 1948, issue of Industry. You may also consult Manufacture of Soap published from this office, price Rs. 3/6/- including postage. We are not aware of any other book on mustard oil manufacture except Vegetable Oil Industry.

4188 H.L.J., Agra Cantt.—Recipes of resin and belladona plaster stick will appear in due course.

4189 B.M.M.C., Calcutta — There is no machine for manufacturing biris. For rope making machines enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. For enamelling you may write to Sur Enamel & Stamping Works Ltd., 9, Middle Road, Entally Calcutta and Bengal Enamel Works Ltd., 15, Old China Bazar Street, Calcutta.

4190 C.M.V., Bhandup—You may stick waste film layer after layer using celluloid cement. Then you may cut buttons out of thick sheets.

4193 K.V.N., Anantapur—Process of manufucturing fireworks will be found in Home Industries published from this office, price Rs. 3/6/- including postage. Raw material may be had of Banshidhar Dutt, 126, Khengrapatty, Barrabazar, Calcutta.

4194 S.C., Cawnpore—Recipes you require will appear in due course.

4196 H.C.R., Shikarpur—Process of manufacturing sodium carbonate appeared in July 1948 issue of Industry.

4203 G.M.N., Dindigul—We have no book on compounding. You may however consult Pharmaceutical Preparations published from this Office, price Rs. 3/6/- including postage. Pharmaceutical chemicals may be had of B. K. Paul & Co. Ltd., 1 & 3, Bonfield Lane, Calcutta and Allopathic Store, 10, Bonfield Lane. Calcutta.

4205 G.G.P., Chikodi Road—Make a paste by adding water to the powder and apply to head. You may add sugar to limejuice to make it sweet.

4206 S.B.S., Byadgi—Your brother may take up sugar technology for which please enquire of the Principal, Indian Institute of Sugar Technology, Kanpur.

Review of Books

THE EAST AND WEST TRADE DEVELOPER, AUGUST 1948 VOLUME 28TH, INDIA-U.S. AMERICA, SPECIAL NUMBER. Published by the East & West Trade Developer, Rajkot, India. Pages 100.

The object of this special number is to promote and develop Indo-U. S. Trade to their reciprocal advantage. A suitable and favourable background has already been prepared by the leading statesman of both these countries, and it is for them to develop and promote by all available means. In this new background it is of utmost importance to closely study and understand the different economic and commercial problems and potentialities.

From that stand point, the special will serve a very useful purpose in as much as it affords a clear inside view of different problems of both these countries. As a matter of fact, it is only when we have understood the problems of one another and have a correct perspective of the whole situation that, a commercial intercourse to our mutual benefit of these countries becomes a practicable proposition. The special number particularly stresses this point as evident by the nature of the topics discussed in this issue, "World Economic problems"—by Willard L. Thorp, Trade Controls and International finance, Thomas C. Blaisdoll Industrial and Agricultural Planning by D. K. Keans, Indo-American Post-War-Trade by S. K. Kripalani.

The articles are highly informative, illuminating and thought-provoking. We welcome wide dissemination of commercial information through the medium of Industrial and Commercial journals particularly when India Government are badly in need of Dollars. We commend it to the interested readers.

THE FACTORIES ACT, 1934 (XXV. of 1934). Published by Law Publishing House, 33 Sheocharanlal Road. Allahabad. Pages 111, price Rs. 5/-.

Factories brought in its trail various complications which assumed such proportions as to disturb the equanimity of Government of India and make factory legislation indispensable. The need for strict observance of these provisions is all the more pressing and urgent in view of the wide-spread labour unrest which is undermining the production. The author of the book "Factories Act" has taken a good deal of trouble to elucidiate the various provisions of factories Act 1934 which is in conformity with the ethics of social welfare of a modern state. The modern state has a moral obligation to intervene effectively when the welfare of the majority is endangered. It is also for the productive and industrial efficiency that the factory managers will do well to abide by the laws rules and regulations contained in this Factories Act. A strict observance will not only lead to amelioration of the conditions of factory workers but will also lead to an increase in the productive capacities of the factories.

It is one thing to pass a legislation, it is a quite different thing to extract the good results out of it.

The task of interpretation is more difficult than that of legislation. As a matter of fact on the clarity and lucidity of interpretation, depends its widespread acceptance. The greater the persuasiveness of interpretation, the more it is likely to be appreciated and obeyed.

Considered from that standpoint, the factories Act, 1934 by M. L. Kharbanda fulfills a very important function. The book clearly and lucidly explains the provisions. We believe this book will prove useful both to the managers and factory workers. The managers may by a strict observance of regulations, make state intervention unnecessary and improve the conditions of factories. Factories Act, in the final analysis is not detrimental to interests of factory owners but on the other hand lead to increased efficiency and output thus leading to substantial benefit to the factories as a whole.

The factories Act is divided into seven different chapters. The most important chapters relate to "Health and Safety," Restrictions on Working hours of Adults, regulations regarding "Holidays with Pay."

Not to speak of lawyers, even laymen can easily grasp the full implications of the differ ent Provisions. Mr. Khirbandha is, evidently, a successful populariser.

SURVEY OF CURRENT INFLATIONARY AND DEFLATIONARY TENDENCIES. Published by the Department of Economic Affairs, United Nations, Lake Success. Pages 85.

The problem of inflation has appeared in distinctive and various forms in the different countries of the world. And this book is a comprehensive survey of the divergent inflationary pressures afflicting millions of peoples in the different parts of the world.

If the United Nations Organisation have to do any real service to the humanity at large, it has, certainly to make a scientific approach to the economic problems that in a large measure imperil the stability of the global economy. It has to undertake an objective and a dispassionate study, unclouded by bias or prejudice. And it is gratifying to note that United Nations have not ignored this vital aspect and on the other hand have taken full cognizance of it.

It is why the department of economic affairs have undertaken a dispassionate study and analysis of the problems that are obviously causing a headache, to the statesmen of these countries. The survey covers United States of America where the question of a possible recession or depression in the near future has been examined, the devastated and war-ravaged countries of Europe where various pattern of inflationary pressure have been examined and causes have been analysed and scrutinised and various measures adopted to counter-act this inflationary spiral discussed. The survey of under-developed countries is what looms particularly important for India. The survey rightly points out that it is deficit financing which is, in a large degree, responsible for great increase in demand. The problem was further aggravated because of relative inelasticity in response to the increased demand. The inelasticity is due to inadequate imports of machinery, fertiliser and raw materials. Imports have evidently failed to solve the problem. Had there been a steady supply of food imports and machinery, the problem might have been considerably solved by an increased production on all fronts.

So it is mainly on the future of development schemes that depend the solution. Although a large part will be financed by balances of foreign exchange accumulated, a substantial part of it will have to be financed at home. And it will have to collect by direct taxation. That, too, will not solve the problem of inflation in food prices because taxation of higher income will hardly reduce the demand for food. Consequently the survey particularly stresses the need for production.

We commend the book to our readers for a correct grasp of the international situation as regards this universal problem in different parts of the country.

NOTICES & REVIEWS

(Manufacturers sending specimens and samples of their products for notice and review may please note that no notice is published of medical preparations and allied substances in this section.)

GLUE.

We have received from Modern Glue Makers, Post Box No. 96, Ahmedabad, one sample packet of glue, which is found to be good.

EMBOSSED NAME PLATES.

We have the pleasure to receive from Messrs. Ahmed Brothers, Gate Nabash Khan, Delhi, two pieces of nameplates duly embossed on aluminium sheet, which are found to be good and attractive.

NEW YEAR CALENDARS AND CARDS.

We are glad to receive new year's calendars from the following:—

Fularjun & Co., Ghia Building, Sutar Chawl. Bombay No. 3; S. K. Banerjee & Co., 10, Hastings Street, Calcutta 1; Bengal Scientific & Technical Works Ltd., P513, Rash Behary Avenue, Calcutta 29; Universal Cardboard Factory, 54, Ezra Street, Calcutta; Mohamedally Dawoodbhoy & Co., 19. Sukeas Lane, Calcutta; Khandelwal Chemi Colours Ltd., 317, Samuel Street, Vadgadi, Bombay 3 and Ahmednagar Chemical Industries, Ahmednagar, Deccan.

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(To communicate with any party write to him direct with name and address given below mentioning Industry).

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XXXIX. CALCUTTA, MARCH, 1949.

INDUSTRY.

A Monthly Magazine for Manufacturers and Businessmen.

Published in the first week of the month by INDUSTRY PUBLISHERS LTD., 22, R. G. Kar Road, Calcutta-4.

EDITORIAL CONTENTS FOR MARCH, 1949.

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Editorial Department — 11 A.M. to 4 P.M. on weekdays and 11 A.M. to 2 P.M. on Saturdays.

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EDITOR:
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AGRICULTURE AS A PROGRESSIVE INDUSTRY—A NEW APPROACH

THE alarming food situation in India and the consequent food import in larger proportions indicate a chronic weakness of our agrarian economy. This chronic weakness, in the final analysis, boils down to an innate conservatism in our framing methods and techniques and we have proved ourselves hopelessly callous to the progressive methods of the western countries of the world.

But matters have come to a head and the problem has to be effectively and scientifically approached before long. The whole thing practically hinges on our approach and outlook, so far as agriculture is concerned. It is however unfortunate that our approach is fundamentally wrong in as much as we draw a sharp line of demarcation between agriculture and industry. In fact, they are so closely inter-linked and inter-woven that one naturally shades into the other. So a division into water-tight compartments will be unwise, inadvisable and unscientific. The same technical aptitude and the same high standard of scientific knowledge are needed for agricultural progress of the country. Agriculture itself is an industry. We can therefore realise the enormity of our blunder while we entrust this grave task to the illiterate peasantry of our country. The crisis is deepening and we can scarcely afford to be blissfully ignorant and remain self-complacent. It is high time that we should begin to reap our harvest out of the scientific knowledge and experience and utilise it for the development of the vast resources of our country.

Of course beginnings have been made in this direction but they are too inadequate for our present needs and requirements. Advanced agricultural education which in the first phase will be imparted to the modern educated youngmen will, in the next phase, percolate to the lowest stratum of peasantry. As a matter of fact, on this section of educated middle-class, devolves a grave task—the task of educating them in the use of modern and scientific methods, disseminating useful information regarding the suitability or otherwise of different crops to the various

(*Continued on page 474*)

Current Topics

AERONAUTICAL RESEARCH.

The latest development in the sphere of scientific and technological research clearly shows that Government of India are particularly encouraging a scientific approach in every sphere of industrial and mechanical problems that confront India to-day. One of the notable instances is the Aeronautical Society of India, established recently in Bangalore. It is significant that Pandit Nehru, the Prime Minister of India, inaugurated the conference and sufficiently impressed upon them the urgency of Aeronautical Research.

Mr. N. C. Ghosh, Director of Civil Aviation, in his introductory speech stressed the vital importance of Aeronautics which was negelcted here in India. Mr. Ghosh deplored that here in India there is no provision for aeronautical research and development though a nucleus already exists in civil aviation company. So one of the primary tasks of Aeronautical society is to impress upon the proper authorities the need for expanded research and development.

Aeronautical research is important from two considerations. Firstly, it will provide employment to hundreds of youngmen, secondly, it will constitute a second-line defence as has been proved in recent Kashmir operations. We hope, that Government will encourage it by all possible ways considering its vital importance in our national life.

ASIAN CONFERENCE.

Asian conference held on 20th January is not a mere spectacular event. Born out of stark necessity it has deep political and economic significance. The situation now in Asia is ripe for mutual collaboration in the sphere of industry commerce and politics among the different nations of this part of hemisphere. We are buoyed up with radiant hope to find that Asian countries have at last made a firm resolve of self-determination by means of mutual co-operation and thus has practically laid the foundation of an Asian Confederation. The conference, therefore, marks a very important milestone in the relations of

(Continued from page 473)

conditions of soil and climate, examining the efficiency and suitability of introducing modern agricultural implements and an application of different types of fertilisers.

The economic consequence of such measures will be obviously far-reaching. It will, in the first place, lead to a general prosperity of the masses, secondly it may absorb a large section of middle-class people to the fruitful and peaceful avocations of agricultural farming and avert the usual calamities of unemloyment, malnutrition and starvation. Fortunately our agricultural resources are vast enough to afford fruitful employment to millions of our countrymen. We urge our Minister for Agriculture to take vigorous initiative in this direction and do everything that lies in their power. The Agricultural Dept. may, in this respect, seek the active co-operation of the University.

Asian countries particularly South Asian Countries. For the first time in the recorded history of the world, we have a group of nations which has just emerged, united in their endeavour to become fully independent, co-operate and take concerted action in economic and political matters.

MANUFACTURING OF HEAVY ELECTRICAL MACHINERY.

Two engineering firms have been appointed to prepare and submit a report on the establishment of a factory for the manufacture of heavy electrical power plant and machinery. This is undoubtedly a new milestone in the history of industrial progress of the country. Telephone factory was the first Government enterprise. It is under way and going to be successful. Factory for electrical plants and machinery, the second major state enterprise, will help considerably the actual execution of hydro-electric projects.

Negotiations have been carried on with two premier foreign firms, the Associated Electrical Industries of England and the general Electric Company of America. They have entered into a contract and have agreed to submit a report within six months.

In accordance with the terms of the contract, the experts, will conduct a preliminary survey, draw up plans for the installation, erection and constructions of a plant to manufacture generators. motors, and other heavy electrical equipment. The plan itself will take nearly five years to be completed before production can be actually started.

According to the report of the Electrical Machinery and Equipment, the the annual demand for such electrical machinery as (1) A. C. 3 phase slipring motors (2) A. C. fractional horse power motors (3) A. C. three phase squirrel cage-motor. (4) A. C. motor starters and (5) A. C. motor generators, will be 45,000. 18,000, 75,000, 60,000 and 4,000 respectively.

The aforesaid plan also indicates targets for transformers, electrical cable and wires, aluminium conductors, rubber insulated cables and winding wires. Further its recommendations cover such essential items as factory electrical equipment, electrical welding plant and accessories.

The proposed factory will be wholly a state-enterprise and state-owned. As two well-known and reputed firms are acting as Government's technical advisers, in this respect, it is but natural that there will be practically no hurdles in the way of smooth and speedy development of the manufacturing capacities of the factory.

SILVER THREAD INDUSTRY.

Silver thread industry is a small-scale industry, concentrated mainly in Surat and Banaras. It provides employment to a large number of workers varying from 40,000 to 45,000, and capital employed is estimated at 10 crores. After the first great war, it had to face severe competition from France. And Government of India, consequently had to impose a high revenue duty of 50 per cent. in 1922, and later in 1931, converted it into a protective duty. The present duty of 60 per cent. advalorem will in accordance with the decision of the Government lapse on 31st March, and will be replaced by a revenue duty from 1st April, this year.

The Board recommended the abolition of the protective duty on the ground that the industry has no need of protection at present, it being firmly and solidly established as not to be shaken by slight tremors, and its products being also of the same standard as those of the imported varieties.

The Board have made two significant recommendations. They deserve our close

consideration. In the first place, they have recommended the establishment of a technical school. Secondly they have recommended that the Provincial Governments concerned should set up a committee to examine and report how far the Factories Act is applicable to the industry as a whole.

This industry assumes particular significance because of the vast possibilities of the industry as a whole. It is reasonably hoped that if properly publicised the industry may create a favourable impression on overseas market. The Board have, therefore, recommended that the Indian Trade Commissioners abroad should examine how export in these markets should be developed. Pakistan, our sister dominion, is one of the nearest and chief market of the product of this industry and the Board have accordingly suggested that in a future trade treaty with Pakistan, the negotiating party should bear in mind the desirability of duty-free movement of Jari products from one country to the other. It is to be hoped that the trade commissioner abroad will make it a point to study prospective overseas markets for our products which are renowned for their artistic finish and craftmanship.

PROBLEMS OF RAYON WEAVING INDUSTRY.

Grave fears are entertained by the business circles as regards the future of rayon weaving industry. The industry may, in near future, face a serious crisis and may have to face keen competition with the Japanese and European products. It may, however, survive, if protection is granted to it and appreciable improvement is brought about meanwhile in the quality of its products.

But an objective study reveals certain disadvantages, under which it is not possible for any industry whatsoever make any headway onward. The ma disadvantage consists in her dependen for its rayon supplies on foreign countri The fact is that India herself does n produce any rayon yarn. The sooner tl hurdle is eliminated, the better for tl industry as a whole.

It is why we watch with keen intere the recent development towards the esta lisment of several factories for the pr duction of yarn.

The factories, we understand, wou begin production either by the end 1949, or early next year. Factories National Rayon Corporation of Bomb and the Travancore Rayon Corporati would produce viscious rayon, wh another factory at Hyderabad would pr duce acetate Rayon. Rayon cloth, M Nanavati said, was consumed in Ind chiefly in the Northern and Southe parts while the Eastern parts of the cou try used both rayon and silk cloth.

It is ascertained that the entire dema for rayon cloth in India may be easily m by the Indian producers here. In that ca the production has to be augment several times more than they are doing present. Rayon cloth production in Ind approximates to 10 to 15 million yards p year, while demand for art silk is as mu 300 million yards.

The whole thing hinges on a regul and an increased supplies of rayon yarn enable the weaving mills to increase tl production. The mills are working shifts at present, but they may work shifts.

Competition from foreign imports now apprehended. The Japanese variet in particular, is of superior type and m highly undermine the position of the i digenous.

So if it is to be enabled to face forei competition it will have to be in the fir

instance protected. But mere protection will be of no avail, unless the industry seriously endeavours to imporve the quality of the output.

In this connection, recommendation made by Mr. Nanavati, deserves our close attention. He points out that at present there is absolutely no control on rayon production and sale in India and he suggests that quality control should be maintained through our Bombay Mill Art Silk Mill Association so as to make indigenous cloth production come up to the standard of foreign cloth.

Among other recommendations, suggested by him, are improvements of the conditions of labour, technical education to Indian youth and provision for Indian technicians in foreign countries. He strongly pleaded in favour of establishing a central Rayon Research Institute which may largely stimulate the spirit of research and consequently an improvement in the quality of its products.

FRUITS PRESERVATION INDUSTRY.

The Indian fruits preservation industry is a war-time development. It grew up and developed under cover of protection and depends for the following raw materials, namely fruit farming, sugar, tin cans, glass bottles. Statistics reveal that during the month ended June, 1947, the production of all varieties of preserved fruit or vegetable products amounted 1,33 crore pounds. The corresponding figure for the year ended June, 1948, is estimated at 1.1 crore pounds. The partition of India partially accounts for the slight reduction in output. But surely it has not upset things beyond recovery. The manufacturers rightly affirm that a sufficient quantity of fruit and vegetables for supply to the preserved fruit industry is available in the dominions.

The claim for protection nearly came up for scrutiny before the Tariff Board. At present the industry is sheltered protective duties ranging from 40 per c to 80 per cent. on different categories canned and bottled fruits. In affordi protection for a period of 3 years endi March, 1950, it was stipulated that form which the protection or assistar should take after 31st March, 19 should be on the basis of further examir tion by the Tarrif Board. Since the beg ing of 1948, when the present measure protection came into force, the All-Inc Food Preservers' Association has be pressing either for enhanced protecti duties or for a grant of subsidy.

We have however grave doul whether Government will accept t claims at all, because people are r likely to be favourably disposed towar such grants of subsidies in industries which they are not in the least intereste So far as information goes, preserv fruits are seldom consumed by the Indi people. That does not however mean th they do not favour the growth and dev lopment of these industries. They w surely encourage and favour the adopti of protective measures in industries th may lead to the development of an i dustry which in the years to come, m gradually develop into a prospecti Dollar-earner.

SCIENTIFIC RESEARCH OF SUGAR CANI

The centre of gravity has been of la shifted to scientific and industrial resear in every sphere of productive activit Mere increased output will practical lead us nowhere, unless it is coupled wi an appreciable improvement in the quali of our product. A two-pronged drive f increased output and improved quality indispensable for the very existence our industries.

It is therefore gratifying to note th under the auspices of the Indian Institu of Sugar Technology, Kanpur, arrang

ments have been made for training in the manufacture of sugar candy and confectionery by improved scientific process. The research scheme has been working under the direct supervision of this Institute for the last 8 years with a view to improving the manufacture of sugar-candy and the economic utilisation of mother liquor for the manufacture of high-grade confectionery. The process, developed, has reduced the cost of production appreciably and increased the output of sugar candy. It has been possible for the first time to produce bright, lustrous, large, independent and well formed candy, crystals in a specially designed Rotary candy crystalliser. Intending manufacturer may receive practical advices and suggestions on application in matters appertaining to processing and equipment.

We shall watch with keen interest the development of this institution which may, in years to come, provide stimulus to these industries, and thus promote the true commercial interests of the country.

REGULATION OF INDUSTRIES.

It is gathered from authoritative sources that the Government of India are considering the form of regulation under which a number of industries as outlined in the statement of April 6, last year will be developed.

According to this policy, the establishment of new undertakings with regards to certain industries such as coal, iron and steel, aircraft, manufacture, ship building, telegraph and telephone equipment and mineral oils is to be the exclusive responsibility of the State, while certain basic industries of national importance such as automobiles, tractors, prime movers, machine tools, heavy chemical and non-ferrous metals are subject to central control and regulation.

As regards regulation of industries in general, exclusive of existing industries, it is considered essential for Government to possess the necessary powers to inspect factories, call for information and return to regulation, production and maintain standards.

In the case of new undertakings, some form of approval for their balanced regional development either through a special authority, appointed for the purpose or by means of suitable operation of capital issues control may be inevitable.

In formulating the policy on the legislative powers necessary in this connection, the Government are eliciting the views of the industrial advisory council which is in session.

PRIZE WINNERS

For Industry Prize Competition, 1948.

Industry Publishers Ltd., offered in 1948 prizes of the value of Rs. 500/- to the writers of six best articles on Pottery Manufacture.

As the response to our prize competition offer is poor, the total amount of the prize is distributed among the four prize winners as follows :—

The First Prize known as the Nalini Mohon Prize after our late Managing Director N. M. Banerjee of **Rs. 200/-** goes to S. N. Iyer, Morvi Hostel, Benares Hindu University, Benares for his article on Sanitary Wares and Sewage Pipes.

Second Prize known as the Naidu Prize after the first donor Mr. G. D. Naidu of Coimbatore of **Rs. 125/-** goes to G. T. Bhide, Head of the Department of Electrical and Chemical Porcelain, Central Potteries, Nagpur for his article on Porcelain Insulator and Its Manufacture.

The Third Prize, known as Naidu II Prize of **Rs. 100/-** is awarded to C. S. Shrikhande, B. Sc., of Laxminarayan Institute of Technology, Nagpur.

Fourth or Consolation Prize of **Rs. 75/-** goes to G. V. L. Narasimha Sarma, B. Sc., Manager, The Cocanada Dayalbagh Inks & Chemical Products Manufacturing Co. Ltd., Cocanada on his article on Porcelain : Its Technology and Manufacture.

TOOTH POWDERS & THEIR MANUFACTURE

ALTHOUGH dental powder is one of the oldest products of the trade its popularity may be said to be definitely increasing. This is quite probably due to the favour in which powder has always been held by the general public. At all events the vigour of the trade is illustrated by the sudden increase in the number of perborates recently placed on the market by various firms. Indeed, the popularity of powder is such that several large firms that heretofore sold only paste are now selling powder also. Although there will probably always be a very wide market for both, it seems quite possible that sales of paste will decline as powders continue to increase.

The manufacturers would welcome such a development because powders are very much easier to make and are less susceptible to the reactions that cause hardening, sweating, separation and all the other difficulties to which improperly compounded pastes are prone.

REQUISITE OF GOOD TOOTH POWDERS.

The first requisite of a good tooth powder is that it shall not be harmful nor gritty. It must clean and polish the teeth well. It must not coagulate or become gummy in the mouth. It must not taste earthy. It must be pleasantly flavoured. It must leave a pleasing after taste in the mouth, and it should be packaged conveniently.

MATERIALS REQUIRED.

The basic constituent of nearly all tooth powders is precipitated chalk. We combine many things with it—acids and and alkalies, soaps and oils, antiseptics and astringents—but the main thing is the chalk. Heavy magnesium carbonate is also frequently used in tooth powders: it is neither better nor worse than precipitated chalk. Precipitated silica is an excellent non-alkaline substitute for chalk, particularly suitable for carbolic tooth powder. Other ingredients that come into the composition of toothpowders are: talc, tri-calcium phosphate, kaolin, perborates, titanium dioxide, potassium bitartrate, orris root powder, starch, etc. The presence of some detergent, such as soap or alkali, is now considered to be indispensable, for the teeth cannot be cleansed by mere rubbing. A wide range of flavouring materials and numerous antiseptics are employed as requirements dictate. In general, any white chemically inert substance as cuttlefish bone and pumice are another and valuable friction adjunct used, especially for those who are afflicted with tarter. To this may be added an oxidising agent such as sodium perborate together with an antiseptic and flavouring compound. The main requirement is to make the powder safe, effective, pleasant and easy to use.

Talc, kaolin and kieselguhr are usually employmed in acid dentifrices. Many chemists dislike kieselguhr and kaolin because of their earthy taste and dark colour. The most widely used and favoured material, as already mentioned is precipitated chalk. This cleanses the teeth thoroughly and polishes them well without in any way injuring the enamel.

FLAVOURING AGENTS.

Among the flavours generally used the following are typical—those containing winetrgreen oil being somewhat more highly regarded for powders.

I.

Cinnamon oil	4	parts.
Clove oil	1	part.
Oil of Wintergreen	15	parts.

Mix.

II.

Spearmint oil	21	parts.
Menthol	1	part.
Wintergreen oil	17	parts.

Mix.

III.

Peppermint oil	7	parts.
Cinnamon oil	7	„
Clove oil	11	„

Mix.

IV.

Anise oil	2	parts.
Cinnamon oil	2	„
Peppermint oil	1	part.
Methyl Salicylate	5	parts.

EQUIPMENTS REQUIRED.

The equipment required for making tooth powders are as follows:—

1. Sifting Sieves
2. Mixing Machine.

No other machines are required for this purpose as the product is easy to make with these mixing and sifting devices.

MAKE UP OF PACKAGES.

The true advance in dental powders has been in the presentment, not in the composition. Elegance and pleasing combination of essential oils, together with a lingering refreshing taste in the mouth after use, is the natural reaction from the extreme and sometimes irritating materials with gritty characteristics.

TYPICAL RECIPES.

The following are some of the typical recipes of dental powders:—

OXYGENATED TOOTH POWDER.

I.

Precipitated chalk	40	parts.
Titanium dioxide	15	„
Zinc peroxide	20	„
White soap, powdered	10	„
Borax	14	„
Flavour as per recipe 1	1	part.

Rub up the flavour with part of the chalk, and mix thoroughly. Then incorporate it with the whole of the mass and sift through a sieve. Then pack.

II.

Precipitated chalk	750	parts.
Magnesium carbonate	150	„
Magnesium peroxide	15	„
Borax	85	„
White soap, powdered	25	„
Peppermint oil	7	„
Anise oil	1	part.

Mix as directed above.

III.

Precipitated chalk	100	parts.
Magnesium peroxide	10	„
Soap, powdered	2½	„
Wintergreen oil	½	part.
Rose oil	¼	„
Menthol	1/10	„

Mix.

ANTACID TOOTH POWDER.

I.

Precipitated chalk	46	parts.
Zinc peroxide	10	„
Tricalcium phosphate	20	„
Soda bicarbonate	6½	„
White soap, powdered	6	„
Sugar, powdered	11	„
Flavour to suit	½ to 1	part.

Mix the flavouring matters with the sugar thoroughly. Add the soap and mix again. Add the bicarbonate and the chalk. Mix. Add the tri-calcium phosphate, zinc peroxide, and the chalk; mix thoroughly and sift.

II.

Precipitated chalk	35	parts.
Magnesium carbonate	25	„
Borax	14½	„
Sodium bicarbonate	14	„
Soap, powdered	4	„
Sugar, powdered	7½	„
Methyl salicylate	¾	part.
Menthol	1/10	„
Cinnamon oil	1/5	„

Dissolve the menthol in the methyl salicylate, add the cinnamon oil and then

add to borax and mix with sugar. Add to other ingredients: mix and sift.

III.

Precipitated chalk	11	oz.
Prepared chalk	5	oz.
Soap, powdered	1	oz.
Sodium bicarbonate	½	oz.
Carmine	6	grains.
Clove oil	15	mins.
Rose oil	15	„

Mix.

ALKALINE TOOTH POWDER.

I.

Precipitated chalk	6	oz.
Magnesium carbonate, heavy	6	„
Carmine	5	gr.
Peppermint oil	15	mins.

Mix well in a mortar the oil with an ounce of the chalk, gradually add the other powders, and sift several times.

II.

Precipitated chalk	730	grams.
Soap, in fine powder	120	„
Sodium bicarbonate	150	„
Oil of Wintergreen	20	c. c.

Note:—This powder is for use in exceptional cases only. It is strongly alkaline.

ACID TOOTH POWDER.

Cream of tartar	24	parts.
Sugar of milk	18	„
Colloid clay	47½	„
Titanium dioxide	10	„
Flavour	1	part.
Colour, if desired	1	„

Add flavours to milk sugar and mix. Mix cream of tartar, clay and titanium dioxide and add the mixture of mix sugar and flavour and also the colour if desired.

ANTISEPTIC TOOTH POWDER.

Precipitated chalk	2	oz.
Orris root, powder	4	dr.
Soap powder	2	dr.
Borax	2	dr.
Phenol	½	dr.
Eucalyptus oil	½	dr.

II.

Precipitated chalk	2	oz.
Orris root powder	1	oz.
Salol	1	dr.
Resorcin	½	dr.
Carmine	3	gr.
Oil of peppermint	6	mins.

Mix.

CARBOLIC TOOTH POWDER.

I.

Precipitated chalk	24	oz.
Sugar, powdered	3	oz.
Phenol	3	dr.
Geranium oil	25	mins.
Glycerin	2	dr.
Solution of carmine	1 to 2	dr.

Mix in the usual way.

II.

Precipitated chalk	3	lbs.
Sugar	1	lb.
Phenol	2	oz.
Oil of wintergreen	1½	dr.
Oil of geranium	1	dr.
Colour, if desired		

Mix.

CHARCOAL TOOTH POWDER.

Levigated charcoal	4	oz.
Heavy magnesia	8	oz.
Sugar powder	4	oz.
Cream of tartar	1	oz.
Peppermint oil	1	dr.

Mix and sift.

QUININE TOOTH POWDER.

Precipitated chalk	36	oz.
Orris root powdered	12	oz.
Cuttlefish bone or pumice	3	oz.
Rose oil	80	mins.
Quinine sulphate	2	dr.
Soap powdered	2	oz.
Cinnamon oil	75	mins.

SMOKERS' TOOTH POWDER.

Precipitated chalk	12	oz.
Menthol	3	gr.

Thymol	10 gr.
Camphor	10 „
Salicylic acid	½ dr.
Pumice powder or Kieselghur	12 „
Soap, powdered	12 „
Rose oil	5 mins.

Mix the menthol, thymol and camphor together in a mortar, add the chalk and the other ingredients, triturating the minutes before sifting.

LUBRICATING OILS FOR CLOCKS AND WATCHES.

IN the designing of machinery the maker seldom has to deal with unlubricated rubbing surfaces. His object is the transference of energy, and its utilisation at some particular place, with as little loss as possible. In effecting this, the relatively moving surfaces are often passed together with considerable force and caused to slide over each other at high velocities. Unless such surfaces are kept aparat by the interposition of a lubricant, the frictional losses will be great, and the wear and tear of the surfaces in most instances, proportionately serious.

Formerly animal and vegetable oils and fats were almost exclusively used for lubricating purposes. the finer qualities being employed for the more delicate machinery and the coarser varieties and dirtier greases for the greasing of cart-wheels and similar rough purposes. At the present time vegetable oils in combination with some mineral oils are employed with much satisfaction in several types of machineries.

In the case of clocks, watches, and other delicate machines the spindles are generally made of hard steel. They work either in agate or other polished mineral bushes, or upon hard brass or bronze. The speeds are generally very slow, and the lubrication imperfect. The pressures are also small, generally only a few pounds or ounces per square inch. The smaller spindles therefore require carefully lubrication with some fatty substance and put into position. The spindles then have the capillary spaces between them and their bearing surfaces filled with oil, which must often last for many months without renewal. The essential properties of a lubricant for such purposes are that it must be as free as possible from tendency either to gum, or thicken by oxidation, or to corrode metal, and it must withstand exposure to temperatures as low as possible without becoming frozen or unduly thickened. The lubricants mostly used are propoise and dolphin jaw oils, ben oils, hazle-nut oil, neatsfoot oil, sperm oil, and olive oil. The oil should be exposed for some time to a temperature rather lower than that to which the mechanism is likely to be subjected in use, and that portion of the oil which remains liquid should be separated by filtration and preserved for use. Any free acid should be removed by the process described at the proper place.

PORPOISE AND DOLPHIN JAW OILS.

These very similar and remarkable oils are obtained from the soft fat of the head and jaw of two marine animals belonging to the family Delphinidoe, viz: the common porpoise, Delphinus phoeoena, and the bottle-nose dolphin, Delphinus globiups. The fat is first washed in fresh water. then put into covered tins and heated for several hours in a closed digester with steam under pressure of about ten pounds per square inch. The tins are then opened. and the liberated oil is poured off from the coagulated membrane and washed with water.

It is then exposed to a low temperature and the portion which remains fluid is separated. This oil. carefully strained to remove all solid fat. is a straw-yellow,

limpid liquid. It is specially prepared in the U.S.A. for lubricating watches and other delicate mechanism. Chemically, it consists largely of the glycerides of valeric and other volatile fatty acids of the acetic series.

Process of Refining is to gently heat it to complete the process of cooking begun by the fishermen. The oil is then placed in tanks or corks to await the process of grading, and often two years may elapse before the trained and skilful eye of the refiner can determine to what class it belongs.

After two years or more of rest, the oil has changed to a condition where its surplus oxygen has united with whatever animal or loose organic matter may have been floating in microscopic particles within it, and they are easily removed by the ordinary strainers. But something is still left in the oil which is very sensible to the high or low range of temperature, and to remove this requires its subjection, while spread out in thin layers, to a temperature far below zero. No further change in its construction can be made except at this very low temperature, nor must it could be too rapidly. When properly done the process is one most interesting to watch. All through its liquid amber little flecks of translucent material appear like frost on glass pane resembling a miniature forest. By means of a certain fine and close grained fabric these particles at this juncture are filtered out.

SPERM OILS.

These oils are obtained from the head cavities and bladder of two different kinds of whale. The crude oils contain spermaceti which crystallises out on cooling; it is separated by straining the oil through bags at a very low temperature (4°C). The liquid oil then obtained is used for lubricating delicate machines.

NEATSFOOT OIL.

Neatsfoot oil is obtained by boiling the feet and hocks of oxen in water and skimming off the oil which rises to the surface. Ten neats' feet yield from 2 to 2½ pints of a pale yellow, nearly odourless oil, which, on standing in a cold place deposit a solid fat. The portion which remains fluid at a low temperature is used as a lubricant for clocks.

BEN OIL.

Ben oil is expressed from the seeds or nuts of Moringa pterygosperma and M. aptera, trees which are natives of Egypt, Arabia, Syria, and the East Indies. The first pressed oil is white or pale yellow in colour, odourless, and has a sweetish flavour. By stronger pressing, a darker coloured oil is obtained, having a bitter taste. The oil remains fluid at 20°C, somewhat viscid at 15°C, begins to deposit a solid fat at 7°C and solidifies at 0°C. It contains the glycerides of stearic, palmitic, behenic, and oleic acids. That portion of the oil which remains fluid at 7°C is used for the lubrication of delicate mechanism, including watches.

HAZEL-NUT OIL.

This oil is obtained from the seeds or nuts of Corylus Avellana, the common hazel. The nuts are known as filberts, cobs, etc. They contain 50 to 60 per cent. of a golden yellow coloured oil, which is used to some extent as a lubricant for delicate mechanism.

OLIVE OIL.

Olive oil is obtained from the fruit of the cultivated olive tree. The finest oil is prepared by hand picking the olives before they become too ripe, gently pressing them by hand in cloths, and collecting the oil which exudes. The limited quantity of oil then obtained appears to be used as salad oil, and some of it as a lubricant by

watch makers, it is purified by agitation with water, allowing the mucilazinous matter to subside, and skimming off the clear oil from the surface. Oil nearly as fine is obtained on the large scale by crushing the ripe olives under millstones or between iron rolls, usually without breaking up the kernels and pressing the pulp, without heating it, in bags under very moderate pressure. After purifying by agitation with water and settlinq this cold pressed oil is called superfine oil chiefly used as a lubricant for watches and as a salad oil.

REFINING THE VEGETABLE OILS.

Neutral oil required in small quantities for delicate mechanism, instruments, etc. can be prepared as follows:—Take a good sample of the oil containing not more than say 7 per cent. of free oleic acid and place it in a bottle with one third of its volume of caustic soda solution, prepared by mixing a 5 per cent. aqueous solution of caustic soda with half its volume of methylated spirit. Add also some phenolphthalein. Stand the bottle in hot water, so as to raise the temperature of the contents to about 150°F, and then shake the oil and soda together, thoroughly but not too vigorously. If the crimson colour of the phenolphthalein is breached, add more soda until the colour remains permanent on continued shaking. Then allow the liquids to separate, while hot, in a bottle or in a separating funnel, and syphon or tap off the lower liquid. Wash the oil by shaking it a few times with a mixture of water two volumes and methylated spirit one volume, allow to stand until the aqueous liquid has separated. filter the oil through a dry filter, and heat it in the water-oven to a temperature not exceeding 212°F or 100°C until bright.

In conclusion, it is not out of place to mention that the exigencies of aviation in high altitudes impose on watch makers the necessity of finding some oil which will remain fluid at such low temperatures as are there met with. The oils of organic origin, as already mentioned, generally in use for watches under ordinary conditions are unsuitable as they are liable to freeze; mineral oils are unalterable but owing to the fact that they do not "stay put" but spread away from the points of frictional contact, they also have proved unsatisfactory.

After a prolonged study of the problem Prof. Paul Woog of the Clichy Laboratory have evolved a process of coating the pivots and holes with a strongly transparent skin. This film or epilamen as it is called, prevents the oil from spreading.

The liquid called "Epilame" is poured into a perfectly clean glass and the parts to be treated are immersed in the bath for two or three minutes; the superfluous fluid is then immediately shaken off and the pieces dropped into sawdust and finally dried in the air. The pallets, main spring, and barrel should not be treated. An alternative method is to put the fluid in small glass phial and cork it with a piece of pith. When required saturate the pith by turning the phial upside down and push the pivots in; this will coat them with a film of molecular thinness. For the holes, peg them lightly with a piece of sharpened peg wood dipped in the fluid.

This process can be applied with advantage to watches under ordinary conditions, especially for precision watches subjected prolonged observatory trials, as it renders possible the use of mineral oils for the escapement which retain their fluidity and do not gum up as those of organic origin are liable to do.

RECOVERY OF WASTE METALS

IN the present day of commercial economy one of the most interesting problems is the utilisation of waste products, many fortunes having been largely built upon the application of some cleverly discovered process for recovering good material from waste. The following processes refer wholly to metallic substances and solutions that are commonly looked upon as useless, or nearly so.

COPPER.

In works where a large quantity of copper is dealt with, this metal is worth recovery from the cleansing baths. Collect all the liquids holding copper in a large cask filled with iron scraps; a chemical action immediately commences, the iron is substituted for the copper to make a soluble salt and copper falls to the bottom of the cask in the shape of a brown powder. To do this operation satisfactorily the iron scrap should be suspended in perforated baskets on the top of the liquor, which should be stirred frequently when the metallic powder of copper will fall to the bottom of the cask. The copper thus obtained is quite pure.

The same method may be employed for recovering the copper from old cleansing acids, or from worn out galvanoplastic baths.

GUN METAL TURNINGS.

These can be profitably utilised for new castings as well as for an addition to other charges. The process is as follows:—

The turnings are melted by themselves, and during the melting process mixed with manganese dioxide in the proportion of 5 parts, by weight of manganese to 100 of turnings. In charging for melting it is advisable to cover the bottom of the graphite crucible ¼ in. deep with manganese dioxide; upon this is placed a layer of turnings about 1¼ in. deep, and so on until the crucible is full. During melting the impurities contained in the turnings settle on the surface and can be readily removed with a graphite ladle. The melt is best cast in buttons (square pieces). When cool each button is cut in order to determine the qualities of the metal by the fractured surfaces. The metal melted in this manner shows a reddish, nearly coppery fracture, and is very tenacious and dense. An addition of manganese oxide, not exceeding, however, 2½ per cent., to new material for melting is also recommended. With this method the crucible should not be covered with tallow, fat, pitch, etc.

GOLD.

All liquids which contain gold, except those in which there is a cyanide, are strongly acidulated by sulphuric or hydrochloric acid, unless they are already acid. Then precipitate the precious metal by a solution of ferrous sulphate. After a few hours standing, it is ascertained that the liquor does not contain any more gold when a new addition of ferrous sulphate does not produce any turbidity. Then collect the precipitated gold upon a filter paper wash, and dry in an iron pan, with weights equal to its own borax, saltpetre and potash carbonate. Gradually introduce the powder into a fire clay crucible heated to a white heat in a good air-furnace. When all is introduced, increase the heat and close the furnace, so that all the metal may fall to the bottom of the crucible. After cooling, extract the fused gold from the crucible. If it is desired to dissolve the powdered gold left on the filter in aqua regia, it will be necessary to wash it several times with dilute sulphuric acid, to remove the ferrous sulphate with which it is impregnated. This mode of reduction is adapted to an impure gold chloride and also to the ungilding acids; but it is imperfect with gold solutions con-

taining potassium cyanide. The best manner of treating the latter liquors is to evaporate them to dryness in a cast-iron vessel and calcine the residue to a white heat in a good crucible. A small quantity of borax or saltpetre may be added to aid the fusion. The resulting fused mass of gold is then extracted from the crucible.

GOLD AND SILVER FROM GOLDSMITH'S SHOPS.

Collect the sweepings, dry them, if necessary, and heat them in a hessian crucible, in order to destroy all the organic substances. Triturate the glowed mass in a porcelain dish or enamelled kettle with water, and treat it with an excess of hydrochloric acid to dissolve any alkalies or calcium carbonate present. The portion remaining undissolved contains gold, silver, copper, sand, clay, ferric oxide, etc. To recover the silver from it, wash it thoroughly with distilled water, and boil it in pure nitric acid, which absorbs the silver. The residue is again thoroughly washed, and from the combined fluids the silver is precipitated as chloride of silver by common salt, or, still better, by hydrochloric acid. The residue remaining undissolved after the treatment with hydrochloric acid is heated with aqua regia, and the gold precipitated by the addition of sulphate of iron (copperas). Sometimes it may pay to treat the residue remaining undissolved in aqua regia with ammonia in order to extract the chloride of silver, the formation of which under the given conditions can scarcely be prevented.

SILVER.

It is found that only about 5 per cent. of the silver used in producing a photograph remains on the finished picture; the ramaining portion is dissolved out during washing. A simple method of recovering this precious metal from the photographic wastes is given below:—

The washings of prints are to b[e pre]cipitated with common salt (s[odium] chloride) thereby forming silver ch[loride.] To perform this operation graduall[y add] the salt with stirring until it for[ms no] longer a precipitate.

Do not add too much salt, as a[n ex]cess will redissolve the chloride. [When] the silver is all thrown down, pour [in a] little hydrochloric acid, which will [clear] the solution. Allow it to stand for [about] 24 hours then draw off the clear wat[er and] take off the silver chloride from the b[ottom] of the vessel.

PLATINUM.

Render any kind of platinun[m bath] acid by hydrochloric acid, unles[s it is] already so, and then plunge cleanse[d zinc] into it. The platinum is reduced [to a] black powder, wash, and calcine to a [white] heat. Dissolving it in aqua regia r[econs]titutes the platinum chloride necessa[ry for] the preparation of the baths. Redu[ce by] evaporating the bath to dryness, st[rongly] calcine the residue, then wash up[on a] filter to remove the soluble salts, and [again] heat to a white heat. The platinun[m thus] obtained is soluble in aqua regia.

NICKEL.

To recover nickel from old sol[utions] make a saturated solution of amm[onium] sulphate in warm water, and add to [the] old nickelplating solution, with co[nstant] stirring. After a few minutes a gr[anular] precipitate of the double sulphate of [nickel] and ammonium will begin to separate[. The] addition of ammonium sulphate shou[ld be] continued from time to time until the [solu]tion becomes colourless. The precip[itated] nickel salt is very pure and, may be [used] directly for making fresh bath.

TIN.

In the recovery of tin from s[crap] many processes were proposed bu[t the] following is the latest one in whic[h]

dried scraps are put into large cylindrical containers in a more or less loose form. These containers are tightly closed and dry chlorine gas is introduced under pressure, either at 3.7 atmospheres at 0°C or 7.6 atmospheres at 25°C. The pressure continues to fall as detinning proceeds owing to the formation of liquid stannous chloride and consequent reduction in the volume of chlorine gas. When the pressure again becomes constant detinning is considered to be finished. The amount of heat formed during the chemical action is dissipated on cooling.

There is another chlorine process in which a dry mixture of chlorine and another gas, such as dry air, is drawn through the scrap by suction instead of pressure. Arrangements are made for reheating the inflowing gases, if necessary by passing them through pipes around which the exit gases of the process are drawn off, these exit gases having been heated by the heat of the detinning reaction. By their subsequent cooling and contraction they form the required vacuum for suction. The detinned scrap is washed dried, and compressed. This method is said to be quicker and simpler, and require less labour and apparatus than some others.

BLEACHING OF FURS.

BLEACHING of furs is for the purpose of lightening the colour most general applied to white haired skins to enhance their beauty and value. These skins comprise white fox, ermine. and occasionally white lambs and white bears. Among such furs, pelts of a naturally pure white tone are relatively scarce, while in the majority of cases the colour ranges from a pale creamy white to a decidedly yellowish shade. Colours which vary from the pure white detract considerably from the attractiveness and consequent value of the fur and indeed, some pelts are so far off shade that they can only be used when dyed a darker colour. Most white skins which are but slightly inferior in colour can be brought to a pure white by bleaching, and they can then be used natural. Some pelts, on the other hand, are particularly resistant to the action of bleaching agents and cannot be sufficiently decolourized to render them suitable for use natural, so these are dyed. For the production of certain delicate and fancy shades on white furs, it is often necessary to bleach the skins in order to be able to obtain pure tones. Occasionally dark furs, such as beaver, are bleached on the tips of the hair, a golden shade being obtained thereby, which is quite popular.

In the bleaching of furs, two steps may be distinguished, first degreasing, and second, bleaching proper. In the preliminary operations of fur dressing, the furs are treated with soap or weak alkalies to cleanse them and to remove excess oil from the hair. During the various processes and manipulations, the hair, especially on white skins, may become soiled or somewhat greasy again, so it is advisable to repeat the cleaning process. This should in every case be as light as possible, using a weak solution of soap for the softer and cleaner pelts, or dilute solution of ammonium carbonate or soda ash for the more greasy haired skins. The skins are then thoroughly rinsed to remove all traces of the degreasing material. This step is very essential in order to obtain uniform bleaching.

Broadly speaking, there are two general methods which can be used in bleaching furs, one involving the use of what are known as reducing agents and the other employing oxidizing substances.

Among reducing agents which can be used for bleaching furs are sulphurous

acid sodium disulphite, sodium sulphite, hydrosulphites, and such other derivatives.

SULPHUROUS ACID.

When sulphur is burned, sulphur dioxide gas is formed. In the presence of moisture, or when dissolved in water, this gas forms sulphurous acid, which is one of the most commonly used bleaching chemicals for all sorts of materials, and is very effective in decolourising furs. The procedure usually followed is to hang up the moistened skins on wooden rods in a more or less cubical chamber made of brick, and lined with wood or lead. No other metals may be used, because they are quickly corroded by the sulphurous acid. The reqisite quantity of sulphur is placed in a pot in the bleaching chamber, and then ignited, after which the doors are set tight. The fumes of the burning sulphur in contact with the moist hair readily exert their bleaching action on the furs, and the operation is allowed to proceed for six or eight hours, or overnight. Then by means of fans or other devices, the air filled with sulphur dioxide gas is withdrawn from the chamber, replaced by fresh air. The door is opened, the skins removed, exposed to the air for a time, then rinsed, and finally dried and finished.

SODIUM BISULPHITE AND SODIUM SULPHITE.

These salts of sulphurous acid are effective in their bleaching action only when in solution in the presence of acids. The acids liberate sulphurous acid from the salts, so this method is virtually the same as before. Instead of using the salts of sulphurous acid, sulphur dioxide may be dissolved in water, and the solution used for bleaching by immersing the furs in it. This procedure, while consuming somewhat less time than the chamber process, is more likely to affect the leather, which would have to be retanned.

HYDROSULPHITES & DERIVATIVES.

The bleaching agent can be prepared by adding zinc dust to commercial bisulphite of soda dissolved in about 4 times its weight of water until no more reaction is evident milk of lime is then added to precipitate the zinc, and the clear supernatant liquid of 1.5°-5°Tw is used for bleaching. The skins are immersed for 12 to 24 hours, taken out, washed and finished. Instead of preparing the hydrosulphite, the commercial products may be used with greater convenience, a solution containing 1 to 4 per cent. of the hydrosulphite powder being used, and the skins treated in this until satifactorily bleached.

The bleaching action of sulphurous acid and hydrosulphite is supposed to be due to the reduction of the colouring matter of the hair to a colourless compound; or possibly to the formation of a colourless compound of the bleaching material with the pigment the former seems the more probable explanation, because the change is not a permanent one, the original natural colour returning after a long exposure of the bleached fur to air and light. However, the results are sufficiently enduring to satisfy the requirements of the trade in the class of furs on which these methods of bleaching are used.

Bleaching chemicals with an oxidizing action generally used for decolourizing furs are hydrogen peroxide and peroxides; occasionally hypochlorites and permanganates are also used.

HYDROGEN PEROXIDE.

Hydrogen peroxide is usually employed for bleaching in the form of its 3 per cent. solution to which is added about 20 c.c. of ammonia per litre. The ammonia serves partially to neutralise the acid which commercial peroxide generally contains, and also to facilitate the bleaching action. The strongly degreased skins are

immersed in the solution until the hair is completely wetted by it, are then removed, and evenly pressed or hydro-extracted, after which the pelts are hung up to dry in the air. As the hair becomes drier, the concentration of the peroxide becomes greater and consequently the bleaching action is stronger. Where there is a likelihood of the leather being affected by the bleaching solution, the ammoniacal peroxide may be applied to the hair with a fine sponge or brush until sufficiently wetted, and then hanging the skins up to dry.

PEROXIDES.

The most important of these is sodium peroxide, which comes on the market as a yellowish white powder, which must be kept dry and away from any inflammable material, as fires have been caused by the contact of the peroxide with inflammable susbstances. When dissolved in water, it is equivalent to a strongly alkaline solution of peroxide of hydrogen.

When dissolved in acid, the alkali is neutralised, and a neutral solution of peroxide of hydrogen and a salt is obtained, and this method is used to obtain peroxide of hydrogen cheaply. 3 parts of sodium peroxide are slowly dissolved in a cold 1 per cent. solution of 4 parts of sulphuric acid, stirring during the addition and making the resulting solution neutral to litmus paper, acid or more sodium peroxide being added as needed. There is then added 3 to 6 parts of a solution of silicate of soda of 90°Tw. The skins are immersed until properly bleached taken out, passed through a weak acid solution, then washed and finished. This method generally requires the leather to be retanned after bleaching. Another process, which involves the use of peroxides consists in rubbing the hair with a pasty mixture equal parts of water, barium peroxi and silicate of soda, hanging up the sk to dry, and then heating and brushing hair.

PERMANGANATES.

The only number of this group tl finds practical application for bleachi purposes is potassium permanganate. T skins are immersed in a 0.1 per ce solution of potassium permangana until the hair acquires a deep bro colour. They are then removed, rins and entered into a second bath conta ing sulphurous acid in solution, p pared by acidifying a solution of sodi bisulphite. The skins are then worked until fully bleached. It is the perman nate which does the bleaching. the s phurous acid being for the purpose dissolving the brown compound manganese formed on the hair.

HYDROCHLORITES.

Chloride of lime and sodium hyd chlorite are the chief chemicals of th types used for bleaching. The skins entered in a weak solution of the hy chlorite, and left until the hair decolourized; then after removing, they passed through a dilute acid, and sub quently through a weak solution of sod thiosulphate in order to remove all tra of the hypochlorite.

Whichever process is used, it customary to give the bleached skins subsequent "blueing," by passing tl through a weak solution of a blue or vi dye such as ultramarine blue, alkali b or crystal violet. The furs are then d and finished off. In drum cleaning w furs gypsum or white sand, or talc used with the sawdust.

Manufacture Of Fat Soluble Vegetable Dyes

THE fat-soluble vegetable dyes are very widely used for colouring edibles of all kinds. Their manufacture is, therefore, a profitable industry if undertaken on a large scale. Among the various vegetable dyes alkannin, chlorophyll and annatto are more or less extensively employed for colouring purposes.

A brief description of their manufacture is as follows:—

ALKANNIN.

This is a fine red dye, present in large quantity in the foliaceous layer of bark of the oriental alkanet root (Anchusa tinctoria). The dried root is extracted in an iron extraction apparatus with benzine. The dye is very sensitive to copper, and hence can only be made in iron vessels. The yield of fat-soluble dye is 5 to 6 per cent. An alcoholic extract can also be made by digesting the root with strong alcohol, as it is not soluble in diluted alcohol, or water. With alkalies the dye gives a fine blue colour. Alkannin is used only for colouring fats, etc.

CHLOROPHYLL.

This preparation is largely used for colouring oils and soaps, and is to some extent used also for preserves. There is really no substitute for chlorophyll as a fat dye, and no aniline dye has been able to displace it. Besides this, its colorific power is exceedingly great, it being used in some cases to colour fats and soaps a green colour, as well as to neutralise any predominant yellow colour and impart by complementary colouring, a neutral and whiter colour to products. Chlorophyll is contained in all green plant parts, from which it is obtained by extraction with strong alcohol in the form of an extract, to the extent of about 5 per cent. This is commonly, but erroneously designated commercially as being 100 per cent. since dilution of this extract, with fatty substances are also common. Nevertheless there may be made preparations of higher concentration from the original extract by removing the accompanying substances, such as plant fats and resins. The chlorophyll is really a mixed colour, consisting of two colouring matters, the pure yellow xanthophyll and the bluish-green phyllocyanin. The former can be removed by treating the alcoholic solution of the extract with benzine, into which the bluish-green colouring matter passes while the alcohol retains chiefly the yellow dye. The latter is known under the name "lutein", as a fat dye. Phyllocyanin is itself bluish-green in colour, but it has the property of combining with metal salts, and particularly with copper, to afford magnificent green compound. For this reason the extraction is primarily carried out in the presence of copper salts, such as copper chloride, so that the colorific constituent of the various commercial chlorophyll is a copper compound of phyllocyanic acid. On this same principle is based also the greening of vegetables, for instance, in the preserving industry by the addition of minute quantities of copper salts, or the greening of pickles in copper kettles, wherein the natural chlorophyll of the vegetable enters into combination to form a copper compound which is not only very stable, but which is not decomposed even by the gastric juice, and which may hence be regarded as harmless.

Chlorophyll is hence a first and foremost a fat-soluble dye. The chlorophyll dye may be converted into an alkali compound, however, whereby it is rendered soluble in water. This water-soluble cholorophyll is used for colouring preserves, in the following manner. The vegetables are boiled in a dye solution until soft, whereby the plant tissues be-

(Continued on page 501).

Pharmaceutical Recipes

LIQUID EXTRACT OF BAEL (B.P.).

Bael Fruit, bruised	1000 grms.
Chloroform water	15000 c.c.
Alcohol 90 per cent., sufficient to produce	1000 c.c.

Macerate the bruised bael fruit for 12 hours in 5000 c.c. of the chloroform water; pour off and serve the clear liquid: repeat the maceration in 5000 c.c. of the chloroform water; press the marc strain in mixed liquids through flannel. Evaporate to 750 c.c. cool; add sufficient of the alcohol to produce the required volume; filter.

Dose 1 to 2 fl. drachms.

SPIRIT OF SAL VOLATILE.

Ammonium carbonate	100 grms.
Strong solution of ammonia	200 c.c.
Oil of nutmeg	15 c.c.
Oil of lemon	20 c.c.
Alcohol	3000 c.c.
Distilled water	1500 c.c.

Place the oil of lemon, oil of nutmeg, and alcohol with the distilled water in a retort; distil 3000 c.c.; then distil and separately collect an additional 225 c.c. Place the latter, together with the ammonium carbonate and the strong solution of ammonia in a bottle holding rather more than 500 c.c. securely cork the bottle and gently warm it in a water bath to 60°C. shaking from time to time until all the salt has dissolved. Filter resulting solution when cold through cotton wool and gradually mix the filtrate with the portion first distilled.

TINCTURE OF IODINE (STRONG).

Iodine	100 grms.
Potassium iodide	60 „
Distilled water	100 c.c.
Alcohol (90 per cent.) sufficient to produce	1000 c.c.

Dissolve potassium iodide in the distilled water then dissolve iodine in it add sufficient of the alcohol to produce the required volume.

CHAULMOOGRA OINTMENT.

Chaulmoogra oil	10 grms.
Hard Paraffin	40 „
Soft paraffin	50 „

Melt the hard and soft paraffins together; add the chaulmoogra oil; stir until cold.

NERVE TONIC.

Calcium glycerophosphate	300 gr.
Sodium „	100 gr.
Potassium „	100 gr.
Magnesium „	100 gr.
Ferri „	50 gr.
Pepsin „	150 gr.
Diastase	50 gr.
Tinct. kolae	1 oz.
Acid formic	200 gr.
Syrup	10 oz.
Distilled water to make	50 oz.

Mix.

ATOMIZER LIQUID FOR SICK ROOMS.

	Parts by weight.
Eucalyptol	10
Thymol	5
Lemon oil	5
Lavender oil	5
Rect. Spirit	110

Mix. To a pint of water mix a teaspoonful for evaporation.

ORANGE SYRUP.

It is made with tincture of sweet orange peel and oil of orange.

Oil lemon	20 m.
Alcohol	½ oz.
Dissolve and add Kieselguhr (or Kaolin)	1 dr.
Water	1 oz.

Allow to stand a day or two shaking occasionally filter and add to a syrup made as follows:—

Sugar	12 oz.
Citric acid	1½ dr.
Water	7 oz.

The oil of lemon and alcohol may be replaced by 1 oz. of tincture of fresh lemon peel.

Another formula follows:—

Syrup	2 gal.
Oil of lemon	2 dr.
Otto of rose	2 m.
Alcohol (90%)	2 oz.
Citric acid	3 oz.

Prepare as above.

EFFERVESCENT BISMUTH-CITRATE AND PEPSIN.

Bismuth Ammonio-citrate	1½ oz.
Pepsin	½ „
Sodium bicarbonate	8½ „
Tartaric acid	4 „
Citric acid	3 „

Mix the powders intimately; place on a tin-lined or enamelled tray; heated to about 100°C and when the particles commence to aggregate, move them about turning the whole over occasionally by means of a broad spatula, until a granular lumpy mass is formed. Remove from the source of heat, break up the large pieces, and pass through a sieve of suitable mesh. Afterwards dry the granules and pressure in well-sealed bottles.

Recipes for Small Manufacturers

HOUSEHOLD BAKING POWDER.

Soda bicarbonate	38	oz.
Mono calcium phosphate	35	"
Corn starch	27	"

Mix the above powders thoroughly in a dry can by shaking and rolling for 30 minutes. Pack into dry air-tight tins as moisture will cause lumping.

ANT POISON.

Sugar	1	lb.
Water	1	quart.
Arsenate of soda	125	grains.

Boil all together and stir until uniform; strain through muslin; add a spoonful of honey the preparation being poisonous should be used with caution.

BOOKBINDER'S GOLD SIZE.

Egg albumen	4	oz.
Glucose	3	"
Starch	1	"
Water	35	"
Amyl acetate	4	"

Mix intimately.

STRONG MUCILAGE.

Gum arabic	2	oz.
Water	32	"
Glycerin	2	"
Salicylic acid	90	grams.

A light coloured mucilage results.

TOMATO KATCHUP.

Tomatoes (After removing skins, seeds, and green spots)	30 lbs.
Salt	1½ to 2½ cupfuls.
Redistilled Vinegar	2½ to 3½ cupfuls.
Sugar	5 to 8 cupfuls.

If redistilled vinegar cannot be obtained, use 4½ to 6½ cups of white vinegar, 5% strength, or 6 to 8 cups of cider vinegar, 4% strength.

Heavy Concentrated Tomato Pulp (Pursee) 100 gal. (Sp. gr. 1.06).

Salt	28	lbs.
Sugar	200	lbs.
Chopped Onions	35	lbs.
Cinnamon	25	oz.
Mace	3½	oz.
Clove	15	oz.
Allspice	15	oz.
Cayene	3½	oz.
Chopped Garlic	4	oz.
Ground Paprika	2	oz.
Vinegar (100 Grain)	15	gal.

Prepare the spice extract with vinegar, but leave out the onion, garlic, and paprika. Add these three separately. The pursee is now boiled up quickly, usually in an open tank. Add the sugar and towards the end add the salt. Very near the end of the cook, add the spice vinegar extract.

BOBBIN ENAMEL.

Shellac	120	parts.
Alcohol	120	"
Mix until dissolved and then add		
Castor oil	1	part.
Pigment	20	parts.
Toluol	2	"

AUTO POLISH.

Naphtha	2½	pints.
Mineral oil	2½	"
Diglycol Laurate	4	"
Ammonia Fort	1	oz.
Water	1	pint.
Glycerin	1	"
Formaldehyde	2	oz.
Fuller's earth	9	"
Bentonite	6	"

Mix the oil together, add the abrasive powders and then the water, glycerin and formaldehyde. Mix rapidly until a smooth product results.

PARCHMENT SLATES.

Good paper is soaked in boiled linseed oil and coated with several layers of the following composition:

Copal varnish	1 part.
Oil of turpentine	2 parts.
Fine sand	1 part.
Powdered glass	1 part.
Ground slate	2 parts.
Lampblack	1 part.

Mix the ingredients well and grind finely. Apply evenly over the well oiled paper. Allow to dry and then repeat several times. The finished sheets can be written on with either lead or slate pencil.

ANTISEPTIC TISSUE CREAM.

Stearic acid	1.5 lbs.
Lanolin anhydrous	1.0 lbs.
White beeswax	0.8 lbs.
White oil	1.65 lbs.
Triethanolamine	0.20 lbs.
Glycerin	1.00 lbs.
Water	4.75 lbs.
Cocoa butter	0.54 lbs.
Perfume	0.01 lbs.

(1) Melt stearic acid, lanolin and beeswax together in mineral oil, heating to 70°C. (2) Heat the solution of triethanolamine in water also 70°C. (3) Make a suspension of cocoa butter in glycerin.

To solution (2) add solution (1) gradually with agitation, and when cooled to about 50°C add the suspension (3). Continue agitation until the product is of uniform consistency. Fill into jars while still lukewarm, and cool in ice-box for setting.

In the Field of Invention

WEIGHT REDUCING DRUG.

Obese persons will be able to lose weight, if a new reducing drug acts on human as it does on animals. The substance, called gossypol, occurs in cottonseed.

In tests conducted on animals, gossypol acts by inhibiting the appetite, thus reducing the food intake, revealed Col. Charles Lawrence, of U.S.A. Moreover its action seems specific on the appetite, with no effects on the heart, kidneys, lungs; or other part of the body. It is hoped that human studies may be undertaken soon to determine if the material is safe effective in reducing the weight of human.

KRYPTON GAS FOR ILLUMINATION.

It is reported that the comparatively rare krypton gas is now being used in the U S.A. to make fluorescent lamps of a new type that are claimed to supply cheaper illumination for home and industrial purposes. Engineers of one of the leading manufacturers of electrical equipment in the U.S.A. report that a 25-watt Krypton tube produces more than five times as much light as an incandescent light bulb of equal wattage. An 85-watt Krypton tube is said to give as much light as a 100-watt conventional fluorescent tube using argon gas.

MAGNETIC FILTRATION OF LUBRICATING OILS.

Processing of lubricating oils by magnetic filtration, to eliminate ferrous contamination in the lubricant, is being given exacting tests on the London Midland Region of the British Railways. The filtration equipment has been designed by the Phillips Electrical Ltd.

The filters are fitted in the main lubricating oil circuit of a 16 cylinder, 1,600 h.p. engine component of a diesel-electrical locomotive. The oil enters the filter from the scavenger pump, and, on leaving it, goes to the oil-cooling radiator. The flow capacity that each filter deals with is 1,500 gal. per hr. Each filter will trap ferrous contamination in the oil flow down to particle size of 1/25000" and, by removing such contamination prevents oxidation of the oil and considerably lengthens its effective lubricating life.

The filters measure 12¾" x 6¾" x 5¾" and can be accommodated in any intricate construction without interference with the layout. The filter is so designed that the ferrous particles *do not touch the magnet itself. It consists of* a powerful permanent magnet surrounded by filter cages which are not in themselves magnetic but which become magnetised only when gripped in position by the magnet and attract metallic particles to their surfaces. Cleaning and replacement take no more than 5 min.

—Journal of Scientific & Industrial Research.

A NEW METHOD FOR OXYGEN DETERMINATION.

An improved method for the direct determination of oxygen in a compound, developed and widely used in Germany, consists of decomposing the compound in a stream of nitrogen, converting the oxygen to carbon monoxide by passing over heated charcoal, and absorbing it in iodine pentoxide. The determination is completed either by weighing the carbon dioxide produced after absorption in ascarite (sodium hydroxide-asbestos) or by titration of the liberated iodine (Sci. News Letter August 7, 1948).

NEW PROCESS PREVENTS MILDEWING.

A process which will lock into linens an effective mildew preventing chemical is announced by the Monsanto Chemicil Coys., St. Louis, Missouri.

Basis of the treatment is a concentrated solution of sodium pentachlorophenate, a water soluble fungicide. It is explained that the treating bath is prepared by adding 8 oz. of an approximately 30 per cent. solution of the chemical to about 40 gallons of water in a standard wood washer, clothes to be treated are rinseed in this solution for five minutes.

The action of the "scouring" rinse, which follows in most laundering formulas, is important. Somewhat similar to bluing the slight acidity of the scouring rinse converts the water soluble chemical in the fibres into a fixed mildew inhibitor. It will remain in the fabric until rewashed, when the high alkalinity of the initial soaking operation re-dissolves the chemical.

By eliminating the need for a strong bleach solution arising from mildew stains, the life of fabric is increased as much as 60 per cent.

—Silk Journal & Rayon World.

NEW REFINING PROCESS FOR SUGAR.

The cost of refining sugar may be greatly reduced by a new process discovered in the United States, according to a report by Dr. Donald F. Othmer, Heal of the Department of Chemical Engineering in the Polytechnic Institute of Brooklyn. The further advantage of saving health giving vitamins also is claimed for the new process.

Dr. Othmer says a very light yellow sugar as pure as that presently sold has been manufactured by the new technique, in which contaminants are washed from the raw sugar with wood alcohol. This represents one of the few major new methods for refining sugar since bone char and other chars were developed 100 years ago. The expensive melting of the (raw) sugar, purification over char produced from animal bones evaporation, re-crystallization and many other steps are all eliminated in this simple process which will operate at a fraction of the use of present huge plants.

—Indian Sugar.

Formulas, Processes & Answers

ARTIFICIAL FRUIT ESSENCES.

1330 I D., Meernt City—Desires to know a few formulas of artificial fruit essences.

The following are some of the important artificial fruit essences.

PINEAPPLE ESSENCE.

Butyric ether	32	oz.
Amyl acetate	8	"
Lemon oil	1	"
Orange oil	½	"
Vanillin	¼	dr.
Jasmin oil	15	mins.
Bois de rose	1	dr.
Alcohol	2½	gallons.
Distilled water	2½	"

Mix. Use 1 oz. of this essence to 1 gallon of syrup.

RASPBERRY ESSENCE.

Butyric ether	4	oz.
Amyl butyrate	2	"
Amyl acetate	2	"
Acetic ether	1½	"
Sebacic ether	½	"
Benzoic ether	¼	"
Formic ether	¼	"
Oenanthic ether	¼	"
Tinct. orris	4	"
Vanillin 1 p.c. solution oil of bitter almonds free from prussic acid	4	"
Oil of lemon terpeneless	3	"
Essence of Raspberry	1	"
Alcohol 95 p.c. to make	1	quart.

Mix.

VANILLA ESSENCE.

Vanillin	7	oz.
Coumarin	1	"
Cane sugar	8	"
Rect. spirit	3	gallons.
Distilled water to make	10	"

Caramel colour to suit.

Dissolve the vanillin and coumarin in the spirit, next dissolve the sugar and the water, and mix. Filter, if necessary.

OIL CLOTH.

1359 S.S.S., Delhi—Desires to know a simple process of making oil cloth.

In order to prepare oil cloth, the linen or canvas should be covered with a liquid paste made in the following manner:—

Take china clay which has been completely cleaned by washing and shifting it from all impurities. It is then mixed with boiled linseed oil to which litharge is added in the proportion of 1 part of litharge to 4 parts of oil. This mixture is then boiled to the consistency of thin paste, which is spread over the cloth or canvas by means of an iron spatula equal in length to the breadth of the cloth. When the first coating is dry a second is applied. Sometimes the cloth becomes rough due to coarseness of the cloth as well as the unequal application of the paste. When this will happen, the cloth should be covered with pumice and then rubbed with a piece of flannel moistened with water. When the last coating becomes dry, the cloth must be well washed in water and dried. Then a varnish composed of lac dissolved in linseed oil boiled with turpentine is applied to it. The colour of the varnished cloth thus produced is yellow but different tints can be imparted to it when any of the colours is added to the varnish, as verdigris for green, umber for a hair colour, indigo and white for a light blue, etc.

HEALING OINTMENT.

1366 O.R.S., Bholaganj—Wants to have formulas of healing ointment, dog fleas, etc.

Benzoated lard	1	lb.
Yellow beeswax	1	oz.
Calamine	3	"
Boric acid	1	"
Clove oil	30	mins.

Melt the lard and wax over water bath and then incorporate the other ingredients. Next remove from the source of heat and but continue stirring until the mass thickens. Then pour in phials.

FLEA SPRAY FOR DOGS.

Kerosene oil	10	grams.
Oleic acid	8	"
Triethanolamine	3	"
Water	100	"

This is made into a primary emulsion and may be diluted with one or two gallons of water for washing infested animals.

MANURE FOR BETEL-LEAF PLANT.

The most suitable manure for betel-leaf plant is a mixture of oil cake, cow-dung and dried pond mud in equal proportions. This may be applied at the time of earthening up the plants.

COPPER ETCHING FLUID.

1369 B.K., Kottayam—Wishes to have a formula of copper etching fluid.

I.

Nitric acid (concentrated)	120	grams.
Potassium chloride	15	"
Water	1000	c.c.

Mix.

II.

Ferric chloride	400	grams.
Hydrochloric acid	30	"
Water	1000	c.c.

Mix.

LABELLING PASTE FOR TIN.

1390 J.J.D.C., Hyderabad—Wishes to know the formulas of labelling paste for tin, etc.

Wheat flour	256	parts.
Boric acid	2	„
Nitric acid	2	„
Glycerine	2	„
Cold water	1280	„

Mix the flour and boric acid with the water into a smooth paste, then stir in the glycerine, then nitric acid, and slowly boil the whole until thick.

FLUID STENCIL INK.

Water	2	gallons.
Treacle	12	lbs.
Glycerine	12	„
Drop black (ground in turpentine oil)	10	„
Glue	1½	„

Boil the glue in the water until dissolved, pour in the treacle and glycerine, then mix with drop black.

WHITE SLATE PENCIL.

1393 I.P.W., Azamgarh—Wants to have a good process of making white slate pencil.

White slate pencil may be made as follows:—

Gypsum	60	parts.
French chalk	30	„
Glass flour	10	„
Paraffin wax	15	„

First melt the paraffin wax and incorporate the other ingredients. Now put the mixture into an extruding machine, which forces the waxed composition through plates perforated according to the circumference of the pencil. When the mixture is in the hopper, it is always kept up to a plastic temperature. There will be practically no wax left in the pencil, as owing to the pressure in passing through the holes the wax is squeezed out and left behind the plate.

LEATHER DYEING.

1934 A.K., Hyderabad—Desires to know the formulas of dyeing leather.

Leather is cheaply dyed with water dyes and spirit dyes. In the case of water dyes the dyestuff is dissolved in boiling water and is applied to the leather with a medium soft brush.

BLACK.

Soft water	1	gallon.
Caustic soda	½	oz.
Nigrosine	12	„
Metanil yellow	12	„

TAN.

Soft water	1	gallon.
Caustic soda	½	oz.
Water Brown	½	lb.

Spirit dyes are prepared chiefly from methylated spirit, acetone, turpentine and white spirit, or mixtures of these.

BLACK.

Methylated spirit	1	gallon.
Acetone	1	„
Spirit black	12	oz.
Castor oil	4	„
Lemon grass oil	4	„

Mix.

COLOURED.

White spirit	1	gallon.
Mineral oil	1	pint.
Dyes (coloured), oil soluble	6	oz.
Oil of mirbane	2	„

Mix. Apply with a soft brush.

LIQUID GUM ARABIC.

1430 R.R., Ongole—Wants to have good recipes of liquid gum arabic, office paste, etc.

Gum arabic	18	lbs.
Distilled water	7	gallons.
Formalin	2	oz.

Dissolve the gum in distilled water by boiling, cool, strain, add formalin, stirring in thoroughly.

OFFICE PASTE.

Distilled water	2	gallons.
White dextrine	7½	lbs.
White sugar	2	„
Powdered alum	7	oz.
Clove oil	1	„
Carbolic acid	1	dr.

Add alum and sugar to the water gradually stirring in the dextrine. Simmer until dissolved (boiling always lessens the adhesiveness of dextrine), cool, stir in carbolic acid, and oil of cloves.

JET BLACK MARKING INK.

Distilled water	40	lbs.
Shellac water varnish	15	„
Aniline Hydrochloride	20	„
Common Salt	8	„
Copper chloride	7½	„
Glycerine	½	lb.

Add aniline salt to the water, then the ordinary salt and chloride of copper, glycerine and water varnish. Mix up and strain well.

WASHABLE DISTEMPER IN DRY POWDER.

1498 V.T.B., Bombay—Wishes to have recipes of washable distemper in dry powder.

WHITE BASE.

Whiting	56	lbs.
Barytes	28	„
Plaster of Paris	28	„
Glue, powder	10	„

Grind thoroughly together.

May be tinted to any of the usual distemper colours, for instance.

LIGHT BLUE.

White Base	112	lbs.
Ultramarine blue	4	„

MIDDLE BLUE.

White base	112	lbs.
Ultramarine blue	10	„

ORANGE CHROME.

White base	112	lbs.
Orange chrome	10	„
Spanish brown	½	lb.

STONE.

White base	112	lbs.
Yellow ochre	6	„
Umber	2	„

GREEN.

White base	112	lbs.
Ultramarine green	14	„
Ultramarine blue	7	„

RED.

White base	112	lbs.
Red oxide	14	„
Vermillion Imitation	7	„

LEMON CHROME.

White base	112	lbs.
Lemon chrome	10	„
Yellow ochre	1	lb.

VINEGAR FROM SUGAR CANE JUICE.

1410 M.N.A., Azamgarh—Desires to have the process of making vinegar from sugar-cane juice.

Take 10 seers of sugarcane juice in an earthenware vessel and bring to a boil. Remove when it bubbles up and strain when cool. Put it into an earthenware vessel. Cover the mouth and bury the same in the ground. The hole should be dug big enough to hide the vessel up to the neck. After some days a film will appear, remove it and cover again. Repeat in this way so long as films are formed. Lastly when this ceases, strain and bottle.

BOILED LINSEED OIL.

1414 D.J.O.M., Mirganj—Wants to know the process of manufacturing boiled linseed oil.

Take one ton of raw linseed oil in a capacious iron tank having an arrangement by means of which air can be blown into the oil from below. Heat the oil to 249°F and then put into the oil very steadily a solution of manganese sulphate in 1 lb. water. After the manganese is put into the oil, and there is no froth on top of oil then slowly put in 14 lbs. of ground litharge. As the froth goes away, blow air into the oil by means of an airpump or by any other means. Also raise the temperature of the oil to about 260°F. A good air pump should finish the oil in 2 to 3 hrs. Take out samples of oil put it over a glass plate. If it dries up in a short time, you will conclude that the oil is finished. Stop blowing air and set aside the oil to cool somewhat. Then pour into sealed containers. The above is for boiled oil.

The process for making double boiled oil is the same as above. Only the amount of litharge has to be increased. In place of 14 lbs. you have to use 15½ lbs. of litharge and blow air continuously for 5 to 6 hours.

DISINFECTING FLUID.

1423 S.M.T., Farrukhabad—Wishes to have good recipes of disinfecting fluid, and brahmi-amla hair oil.

Rosin	25	lbs.
Castor oil 2nd quality	20	„
Caustic soda lye 30°Be	60	„
Light creosote oil	100	„

Melt the rosin, add the castor oil and when thoroughly incorporated and while the mixture is still warm add the caustic soda lye and boil until the whole is saponified. Add a quantity of water from time to time if required. Lastly dissolve the soap thus formed with 3 to 4 times its volume of water and allow to cool.

When nearly cold add the creosote and stir. This gives the disinfecting fluid of good quality.

The object of using castor oil is to give whiteness to the fluid when mixed with water: the product otherwise should be brown. mixture of caustic soda and potash is also used as an easier mixing product. Naphthalene in cresol and other coal-tar bases, for disinfectants are the most frequent cause of this insolubility. A good way to get rid of it is to allow the fluid to stand for about three months during which the naphthalene crystallises out, and the fluid should be decanted from it.

BRAHMI-AMLA HAIR OIL.

In preparing this medicated oil, sesame oil is generally used. This oil, before being boiled with medicinal substances is first of all heated to deprive it of any water by evaporating. It is then purified by steeping in it the following substances for 24 hours viz., madder 1/16 part by weight of oil, turmeric, wood of symplocos racemosa, tubers of cyperus rotundus, a bark called nilaka, the three myrobalans, root of pavonia odorator and the tender shoots of pandanus idoratissium, each one sixty-fourth part in weight of the oil. These ingredients in fine powder should be soaked in the oil, with the agitation of an equal quantity of water for a day. The mixture should then be boiled till the water is evaporated, and finally strained through clean cloth. To the oil thus prepared dried brahmi herb is added in the portion of 4 parts of the herb to 16 parts of oil. The mixture is then boiled the watery parts are all evaporated. This is then allowed to cool and strained.

To perfume the oil proceed as follows:—

Prepared oil	40	oz.
Sandal oil	2	dr.
Lemongrass oil	1	„
Geranium oil	2	„
Bergamot oil	2	„
Clove oil	1	„
Musk otto	2	„

Mix and keep aside for a fortnight to mature and then pack in phials.

TAMBUL MASALA.

1441 L.N., Negapatam—Wishes to have a formula of preparing tambul mosala.

Liquorice powder	2½	tolas.
Pollan of keora	2½	„
Seeds of cardamom major	1	tola.
Seeds of cardamom minor	1	„
Cloves ground	1	„
Cinnamon	1	„
Saffron	1	„
Betelnut chips	24	tolas.

Mix and pack.

EMBOSSING INK FOR LEATHER.

1442 S.R.M., Wants to have a formula of preparing embossing ink for leather.

Cellulose nitrate	9	parts.
Pigment	20½	„
Castor oil	10½	„
Ethyl acetate	10½	„
Ethyl alcohol	15½	„
Butyl acetate	34½	„

Mix.

SAND PAPERS AND EMERY PAPERS.

1444 K.S.T., Rameswaram — Desires to know methods of making sand and emery papers, etc.

For this line of work the demand is primarily for glues of the higher viscosities, but a strong jelly strength is deemed important. The first treatment consists of sizing paper with a 10 per cent. glue solution. Paper is festooned until dried. Upper surface is then coated with a 35-40 per cent. glue solution, upon which the abrasive grain is sprinkled. The whole is again dried. The third treatment consists of applying a 10 per cent solution of the same glue to bind the grains firmly together are sifted over surface, and then paper passes into drying chambers.

ABRASIVE WHEELS.

For polishing metals and alloys, wheels composed of paper or felt disks are coated with hide glues at a proportion of 1 part glue, 2 parts water which has been dissolved in the customary manner. Glue is applied to wheel at temperature of 140°F and then wheel is promptly rolled into desired sized abrasive grain, and then allowed to dry for 24 to 18 hours, after which it is ready for use.

PREPARATION OF EXTRACTS.

1463 J.N., Ludhiana—Wants to be enlightened with the process of preparing extracts.

Extracts are prepared by exhausting crude drugs by means of suitable menstrua, the finished preparations being of various forms.

The solid extracts vary according to the amount of moisture left in them and may be classified as:—

Thin (soft) Extracts.
Thick (firm) Extracts.

DRY (POWDERED) EXTRACTS.

When the whole of the moisture is removed they become dry (Powdered) extracts.

The liquid extracts are usually prepared of such strength that 1 fl. oz. represents the active ingredients of 1 oz. of the crude drug. The exceptions to this rule are the cases of the liquid extracts of the more potent drugs which are usually standardised to a definite strength of active ingredient.

The menstruum used for extracting the drug depends on the nature of the drug. It may be water, strong alcohol, or varying mixtures of the two. Sometimes glycerin is added to the alcoholic menstruum.

Since so many methods are used in the preparation of the extracts, details of the principle be consulted from standard books.

PREPARATION OF AMMONIA.

1478 L.R.D., Ambala—Desires to know a process of preparing ammonia.

There are various methods for obtaining pure ammonia solution of sp. gr. 880 from crude liquor obtained as a byproduct in the manufacture of coal gas. The methods consist essentially in redistilling the latter after addition of excess of lime, and after freeing the vapour as much as possible from water by means of a reflux arrangement, passing it over lime and wood charcoal contained in suitable vessels, and then into pure water.

A simple arrangement for the manufacture of pure liquor-ammonia consists of an ordinary boiler fitted preferably with a reflux arrangement and connected with a series of tanks made of iron or wood lined with lead, and containing trays of slaked lime. Beyond these are a series of absorption vessels. They must be provided with a hydraulic inlet valve to prevent regurgitation and with taps for drawing off the strong liquor into carboys. The boiler is charged with crude ammonia liquor mixed with a large excess of milk of lime. The absorbers are charged with pure water.

LYSOL (B.P.)

1498 V.T.B., Bombay—Wants to know the exact formula of lysol and also pale copal varnish and black enamel paint.

Cresol	500	c.c.
Linseed oil	180	grms.
Potassium hydroxide	42	grams
Distilled water sufficient to produce	1000	c.c.

Dissolve the potassium hydroxide in 250 c.c. of distilled water, add the linseed oil, and heat on a water-bath, mixing thoroughly;

continue to heat until a small portion dissolves in water without the separation of oil drops. add the cresol, mix thoroughly, and add sufficient distilled water to produce the required volume.

PALE COPAL VARNISH.

Turpentine	1	pint.
Copal, powdered	3	oz.

Take the turpentine oil in a bottle and put it on a water bath. Then add to it in small portions at a time 3 oz. of powdered copal that has been previously melted by a gentle heat, and dropped into water in a few days decant the clear portion and bottle. The varnish thus prepared dries slowly but is very pale and durable.

BLACK ENAMEL PAINT.

Carbon black	15	lbs.
China clay	25	"
Barytes	35	"
Boiled linseed oil	10	"

Triturate and grind intimately in a paint mill.

CUSTARD POWDER.

1513 M.S., Lahore—Wants good recipes of custard powder, etc.

Custard powder is a mixture of good starch with colouring and flavouring materials. A good formula is as follows:—

Rice flour	2	lbs.
Arrowroot	1	lb.
Liquid extract of saffron	1	dr.
Oil of bitter almond	20	mins.
Oil of neroli	3	mins.

Mix the liquids in a mortar with a few ounces of rice flour, until 8 oz. of the latter has been used, sift, and mix with the rest of flour and arrowroot. Again sift.

JELLY CRYSTALS.

Granulated sugar	48	lbs.
Gelatin, in course powder	7	"
Tartaric acid in powder	3	oz.
Oil of lemon	2	"
Colour, a sufficiency.		

Dissolve a quantity of the mixture in hot water allow to cool. When nearly cold run into moulds if required.

PRECIPITATED CHALK (LIGHT).

1526 K.I.W., Beawar—Wants to have a process of preparing precipitated chalk.

To prepare light precipitated chalk take chalk or marble or calcined oyster-shells and dissolve it in hydrochloric acid; thereby obtained calcium chloride containing alumina oxide of iron, and earthy phosphates as their impurities. Next remove these by precipitating them with enough ammonia or milk of lime. Then filter. Treat the purified calcium chloride thus obtained with sufficient ammonium carbonate solution as long as precipitate forms. The precipitated chalk is lastly purified by washing with water twice. Finally it is dried in the sun.

BENZYL BENZOATE.

1535 P.C.C., Benares—Desires to learn the processes of preparing benzyl benzoate and benzyl acetate.

To prepare benzyl benzoate take 10 grams of metallic sodium and dissolve it in 200 grams of benzyl alcohol. Heat the solution to about 170°C and then pour with vigorous stirring into 1 kilogram of benzaldehyde heated to about 110°C. A lively reaction sets in with such an evolution of heat that the temperature occasionally rises to 200°C. The reaction is a purely catalystic one, and consists simply in a condensation of bezaldehyde. When this is complete the solution is poured into water, acidified with acetic acid and steam to distilled. The benzyl alcohol is distilled off and the benzyl benzoate is separated out as crystals melting at 21°C.

BENZYL ACETATE.

Benzyl acetate is a colourless, sweetsmelling, fruity liquid. 5 parts of benzyl chloride, 4 parts of glacial acetic acid and 4 parts of fused sodium acetate are boiled for about 24 hours when the reaction is complete. The acetic acid merely acts as a solvent. The esterification is followed by taking, from time to time, samples and estimating the unchanged benzyl chloride; when i is complete the excess of acetic acid is distilled off, the residue is washed with water and distilled at 21°C.

METHYLENE BLUE.

1537 R.H.K., Benares—Wishes to learn the process of preparing methylene blue.

Diemethylaniline	24	grams.
Hydrochloric acid, conc.	65	"
Sodium nitrite	7.1	"
Zinc dust	20	"

Sodium thiosulphate	50	grams.
Potassium bichromate	25	"
Sulphuric acid, conc.	53	"
Sodium chromate, neutral	8	"

Dissolve 12 grams of dimethylaniline in a mixture of 40 c.c. of water and 65 grams of concentrated hydrochloric acid, and cool the solution with ice to 12°-15°C. Stir the mixture and slowly run in the sodium nitrite, taking care that the temperature does not rise above 15°C. The compound thus formed is next reduced by carefully adding the zinc dust, and the reduction is complete when the solution is of a clear red colour. The amount of zinc dust added must be sufficient to neutralise the hydrochloric acid, so that the blue 500 c.c. and a solution of 12 grams of diemethylaniline in the exact quantity of hydrochloric acid necessary to form the hydrochloric added, and then a solution of 50 grams of sodium thiosulphate in a little water.

Then oxidise the mixture by adding a concentrated solution of 25 grams of potassium bichromate and boiling for 2 hours.

Now pour the sulphuric acid being diluted with 100 c.c. of water and boil so as to expel sulphur dioxide formed in the reaction.

Next oxidise the leuco-methylene blue by adding the neutral sodium chromate dissolved in a little water and precipitate the resulting dye by the addition of salt.

Again, filter the base, dissolve it in a little boiling water to which a little hydrochloric acid has been added and again precipitate by common salt, filter and finally dry on a porous plate.

GRAPHITE CRUCIBLE.

Graphite	2 parts.
Fire clay	1 part.
Water	q.s.

First grind the graphite and sift. Then mix it with the fireclay and sufficient water to render it plastic. Now press it in metallic moulds. Allow the moulds and their contents to dry in a stove or slow oven. In a short time, from the contraction of the clay in drying, the crucibles may be removed, and the moulds as soon as they become dry, may be again filled.

BLANCO.

1542 C.M., Delhi—Wants to have good recipes of making blanco of different shades.

Whiting or china clay	74 parts.
Glue	1 part.
Water	25 parts.

The water is warmed to about 176°F and the powdered glue is stirred in until dissolved. The whiting is then added slowly with constant stirring after the source of heat has been removed and to each 100 lbs. of mixture 8 oz. of sodium salicylate are added to prevent decay of the glue during subsequent storage. When the paste is smooth and uniform it is placed in warm moulds and after cooling the cakes are removed and packed.

For coloured blanco use pigments such as yellow ochre, chrome oxide, red oxide of iron.

CHALK CRAYONS.

1548 R.L.P., Ambala Cantt.—Wishes to have a recipe of chalk crayons.

	Parts.
Precipitated chalk	40
Plaster of Paris	45
Lithopone	10
Glue solution	5.10

Knead all together to make a soft dough and pour into gun metal moulds. When set take out and allow to dry in air. Then put all together in a tray and moderately bake over mild fire.

COMPHORATED SULPHUR OINTMENT.

1567 B.D., Kanpur—Wants to have a formula of preparing camphorated sulphur ointment.

Sublimed sulphur	1 oz.
Carbolic acid	1½ "
Resorcin	1½ "
Camphor	1½ "
Solution of coal tar	2½ "
Lard	21 "
Soft paraffin	21 "

Melt the lard and soft paraffin and then incorporate other ingredients after removing from the source of heat.

ARTIFICIAL GEM STONES.

1576 B.T., Trichinopoly—Desires to know the formula of making artificial gem stones.

The raw materials for the production of artificial gems are the finest silica and, as a rule, finely ground rock crystals; white sand and quartz, which remain pure white even at a higher temperature, may also be used.

Artificial borax is given preference, since the native variety frequently contains substances which colour the glass. Lead carbonate or red lead must be perfectly pure and not contain any protoxide, since the latter gives the glass a dull, greenish hue. White lead and red lead have to dissolve completely in dilute nitric acid or without leaving a residue; the solution, neutralized as much as pos-

sible, must not be reddened by prussiate of potash. In the former case tin is present, in the latter copper. Arsenious acids and saltpeter must be perfectly pure; they serve for the destruction of the organic substances. The materials, without the colouring oxide, furnish the starting quantity for the production of artificial gems; such glass pastes are named "strass."

The emeralds, a precious stone of green colour, is initiated by melting 1,000 parts of strass and 8 parts of chromic oxide. Artificial emeralds are also obtained with cupric acid and ferric oxides, consisting of 43-44 parts of rock crystal: 21.92 parts of dry sodium carbonate; 7.2 parts of calcined and powdered borax; 7.2 parts of red lead: 3.65 parts of saltpeter 1.21 parts of red ferric oxide, and 0.6 parts of green copper carbonate.

Agates are imitated by allowing fragments of variously coloured pastes to flow together, and stirring during the desiquation.

The amethyst is imitated by mixing 300 parts of a glass frit with 0.6 parts of gray manganese ore or from 300 parts of frit containing 0.8 per cent. of manganic oxide, 36.5 parts of saltpeter, 15 parts of borax, and 15 parts of minimum (red lead). A handsome amethyst is obtained by melting together 1 000 parts of strass, 8 parts of manganese oxide, 5 parts of cobalt oxide, and 2 parts of gold purple.

Latterly, attempts have also been made to produce very hard glasses for imitation stones from alumina and borax with the requisite colouring agents.

Besides imitation stones there are also produced opaque glass pastes bearing the name of the stones they resemble, e.g., aventurine, azurestone (lapis lazuli), chrysoprase turquoise, obsidian, etc. For these, especially pure materials, as belonging to the most important ingredients of glassy bodies are used, and certain quantities of red lead and borax are also added.

PURIFYING HONEY.

1581 L.B.L., Jwalapur—Wants to learn the process of purifying honey and testing it.

To purify honey heat it and allow the scum to rise to the surface. Then strain and adjust, if necessary, the specific gravity at 15.5°C to 1.36 by the addition of distilled water.

Tests for purity. Specific gravity of pure honey is 1.359 to 1.361. Take 20 grms. of honey and dissolve it in sufficient water to produce 100 c.c. This solution complies with the following tastes:—

Optical rotation after decolourising with charcoal, if necessary, + 0.6° to 20°, corresponding to a specific rotation of + 3° to —10° for the original purified honey.

Stir 10 c.c. of honey with 5 c.c. of ether. Allow to separate, and draw off 2 c.c. of the ethereal layer into a small dish. Allow to separate, and draw off 2 c.c. of the ethereal layer into a small dish. Allow the ether to evaporate, and add to the residue one drop of solution of resorcinol in hydrochloric acid; no persistent cherry-red, or brown-red, colour is produced, but at most a transient pink colour which fades in half a minute (absence of artificial invert sugar).

Leaves, no incineration not more than 0.3 per cent. of the weight of residue.

ICE CREAM POWDER.

1597 S.I.C.F., Patna—Wishes to have a formula of making ice cream powder.

Dried milk powder	51	parts.
Sugar powder	52	"
Sodium carbonate	2	"
Cream of tartar	4.4	"
Vanillin	½	part.

Mix. 1 pound of above makes 10 lbs. ice cream.

LENS POLISH

1618 L.D.N.J., Jullundur—Desires to have a recipe of lens polishing composition.

Ammonium linolate	20	parts.
Orthodichlor benzol	100	"
Water	200	"
Infusorial earth	60	"

Dissolve ammonium linolate in the water overnight and run in the orthodichlor benzol while heating with high speed mixer. Then heat in the remaining ingredients until uniform mixture is produced.

LINALYL ACETATE.

1628 P.C.C., Banaras—Desires to learn the process of preparing linalyl acetate.

This vauable ester is very difficult to prepare on account of intramolecular changes, linalol being transformed into isomeric-terpene-alcohols. The following method is stated to give good results:—

Oil of linalol	3	parts.
Xylene	10	"
Acetic anhydride	18	"
Fused sodium acetate	6	"

Heat the ingredients together for 15 hours to 105°C with continuous stirring. Water is added to decompose the excess of acetic anhydride and the solution neutralised with caustic soda. The product is distilled in vacuo and 60 per cent. yield of linalyl acetate, on the weight of oil employed, is obtained. Apart from the ester a terpene is isolated in a proportion equal to 35 per cent. of the original material, this can be transformed, by means of anyhydrous hydrochloric acid gas into a chloride, which in its turn can be converted by means of sodium acetate in the presence of copper sulphate, as a catalyst, into a mixture of acetates in which linalyl acetate predominates.

HAIR FIXATIVE.

1650 R.S.B., Delhi—Wishes to have a formula of hair fixative.

Fixative jellies may be prepared by mixing tragacanth (5 parts), with alcohol (5 to 10 parts), and glycerine (5 to 10 parts) and perfuming the mixture and then adding, all at once, 75 to 85 parts of water.

COFFEE EXTRACT.

1665 H.M.R., Hindupur—Desires to know a good process of making coffee extract.

Coffee extract or essence is prepared from freshly roasted coffee with or without the addition of chicory by percolation or by concentrating an infusion of coffee, as examplified in the following formula.

Freshly ground coffee	1 lb.
Freshly ground chicory	½ "
Water	3 pints.

Boil in a covered vessel for 30 minutes; strain, press, filter and make up to 3 pints with water.

then add

Sugar	5 lbs.

Heat till dissolved.

METALLIC INKS.

In ornamental writing it is customary to use inks that produce characters with a metallic colour and lustre. Such inks can be made in two ways; one can either use the metals themselves or certain dyes which, under particular circumstances, acquire a matallic lustre. If an unalterable metallic ink is wanted, it must be made from a precious metal, gold or silver, for all other metals oxidise in time and change their colour. This is particularly true of copper.

REAL GOLD AND SILVER INKS.

To produce these the metal, in the form of leaf, is ground up with gum and water, in a mortar till even a strong lens shows no sign of metallic lustre. Water is then added, but the ink must be left thick or the metal would rapidly settle to the bottom. Even then the ink before must always be well shaken. In the case of gold it is better to dilute it with a solution of picric acid than with water. Then much more water can be poured, and the writing will nevertheless have a fine gold colour and lustre. The use of picric acid lessens, too, the extrem costliners of the ink.

IMITATION GOLD INK.

This is made from "aurum musivum which is ground up with a gamboge ink. Th ink, although not so beautiful as tl real gold ink, has the advantage over bron ink that it keeps its colour.

Lead iodide, which forms glistening gold spangles, can also be used for imitation gol inks. Equal quantities of potassium iodide ar lead acetate are mixed, and treated on a filt with twenty times, their weight of boiling di tilled water. The lead iodide, which separat from the filtrate, is then ground up with solution of gum.

IMITATION SILVER INK.

For this ink tin foil is ground up with th gum, but a better imitation can be made wit aluminium foil or leaf. The aluminium kee its silver colour permanently.

(Continued from page 490).

come charged with the colouring, an then the coloured liquid is allowed to drai off, the material being next treated wit very dilute vinegar. By this treatmer the alkali compound of the chlorophyll i again converted into an insoluble com pound which adheres pigment like to th fibres, while the traces of vinegar ar washed out. The vegetables are the coloured permanently green, and impai no green colour to the liquor in which the are marketed.

ANNATTO.

The annatto dyes are made exclusive ly from annatto seed by extraction wit ether. The extract, bixin, is soluble i fats and oils with pure yellow colour, an is used particularly for butter and chees for the latter purpose it is dissolved i ammonia whereby its colour is changed t a reddish or egg-yellow tint.

Brief Queries and Replies

Questions of any kind within the scope of Industry are invited. Enquiries or replies from our experts will be published free of charge in serial order. Questions are replied by post on receipt of As. 8 stamps for each question. Subscribers outside India are requested to send two International Reply coupons for each question. In order to facilitate the work of Editor's Department and to help prompt action the readers are requested to send enquiries in separate letters.

4207 K.M.B., Ernakulam—You may use saw for cutting plastic rods and sheets. You should use grinding wheel for polishing ends of rods and sheets.

4208 F.T.P., Ambasamudram—Process of manufacturing lemon squash and artificial squash appeared in January, 1949 issue of Industry. For detailed process you may consult All About Fruits published from this office, price Rs. 4/6/- including postage.

4290 A.G., Lucknow — For electric bells enquire of the following firms: Calcutta Electric Manufacturing Co., Ltd., 8, Royal Exchange Place, Calcutta; Friend's Electrical Works, 56, Lansdown Rd., Calcutta; Khanna Electric Co., 50, Ezra Street, Calcutta and P. A. Moon & Co., 52, Ezra Street, Calcutta. For aluminium sheets enquire of Aluminium Corporation of India Ltd., 9, Netaji Subhas Road, Calcutta and Aluminium Production Co. (India), Ltd., 5, Council House Street, Calcutta. For zinc sheets and iron strips enquire of Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta. For rubber bags enquire of Deformity Appliances and Orthopedic Stores, 3, Bankim Chatterjee Street, Calcutta.

4210 H.B.P., Gadag—Process of manufacturing mirror will be found in Independent Careers for the Young published from this office, price Rs. 3-6 including postage. Following is a formula of phenyle: Rosin 85 lbs; castor oil 20 lbs.; caustic soda lye 30°Be 60 lbs.; light creosote oil 100 lbs. Melt the rosin, add the castor oil and when thoroughly incorporated and while the mixture is still wam add the caustic soda lye and boil until the whole is saponified. Add a quantity of water from time to time, if required. Lastly dissolve the soap thus formed with 3 to 4 times its volume of water and allow to cool. When nearly cold add the creosote and stir. This gives a disinfecting fluid of good quality.

4212 M.A.M.H., Bijnor—Process of manufacturing clay pot will appear in due course.

4214 M.I., Rawalpindi — You may consult Textile Raw Materials and Their Conversion into Yarns by J. Zipser.

4215 M.L.K.S., Agra—A good formula of rubber solution appeared in November 1947 issue of Industry.

4216 K.P., Gaya—For typewriter ribbon ink and other accessories enquire of Globe Typewriter Co., 10, Clive Row; Eastern Typewriter Co., 3, Mangoe Lane and Calcutta Typewriter Co., 3-1, Mangoe Lane, all of Calcutta.

4227 F.S., Bhopal — For polishing old gramophone records you may use coconut oil. It is not possible to revivify old records.

4228 B.N., Gurdaspur—Process of manufacturing battery solution and distilled water appeared in January, 1948, issue of Industry. Process of manufacturing gasket shellac appeared in September, 1947, issue of Industry. Following is a formula of insulating tape: Rosin 20 parts; rosin oil 30 parts; coal tar 20 parts; wood tar 10 parts; mineral oil 10 parts; linseed oil 10 parts. Mix the ingredients over a moderate fire and treat the tape with the composition.

4233 F.M.A., Nimbhora—You may cut the green plantains and despatch to the required destination. No preservative is known.

4234 C.R.B.C., Kakinada—You have to use vacuum packing machines which may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta and Volkart Bros., 8, Netaji Subhas Road, Calcutta.

4236 S.M., Karachi—You have to use centrifugal machine for making sugar out of jaggery. Process of refining jaggery appeared in January, 1948, issue of Industry.

4238 S.D., Coonoor—Pine oil contains a very high percentage of bornyl acetate. Further particulars are not available.

4239 K.C.B., Mathura — For plants and machines required for burning and grinding lime enquire of Balmer Lawrie & Co., Ltd., 103, Netaji Subhas Road, Calcutta.

4240 J.K.S., Muzaffarpur—A formula of phenyle will be found under No. 4210 above. Following is a recipe of cycle oil: Refined castor oil 1 lb.; refined cottonseed oil 1 lb. Mix and use. It is not possible to manufacture

candles giving different odours in the same candle.

4250 L.D.P.W., Udaipur — In 100 lbs. sesamun oil you should use 6½ lbs. animal charcoal. After mixing animal charcoal the oil should be placed in the sun for 15 days and then filtered. You should use 12½ lbs. brahmi leaves in sesamum oil.

4251 U.J.M., Poona—Process of cloth printing will be found in Cotton Dyeing & Printing published from this office, price Rs. 3/6/- including postage. Colours may be had of Ciba (India) Ltd., Jehangir Bldg., Esplanade Road, Fort, Bombay and National Aniline and Chemical Co., Patel House, Church Gate Street, Vadgadi, Bombay.

4253 D.P., Samastipur — For motor rickshaws enquire of V. I. Industries Ltd., of Calcutta. As regards mining of coal you better consult a mining engineer.

4259 A.S.D., Gangtok — You may use carding machines, for which write to W. H. Brady & Co. Ltd., Mercantile Bldg., Lall Bazar, Calcutta.

4261 K.I.I., Trichur—We are not aware of any institute where practical training is given on mirror making.

4265 M.C.J., Bankipur—Following is a formula of lozenge by cold process: Icing sugar 70 lbs.; groundnut 8 lbs.; pure water 12 lbs.; gum tragacanth 10 oz.; vaniline sugar ½ lb.; white gum 2 lbs. Dissolve groundnut paste in the water and use this liquid to dissolve the two gums separately. Add the vanilline sugar when mixing the paste. Colour a deep brown with burnt sugar, and then dry at a low temperature and stamp.

4266 S.L.K.B., Chaibassa—We cannot supply you a formula of special kind of soap. A formula of washing soap appeared in September 1948 issue of Industry.

4268 S.K.B., Calcutta—Luminous paint is used on dials of watches. For this purpose pure zinc sulphide is activated with a very small percentage of a copper compound. The luminescent zinc sulphide thus produced is usually a very pale-coloured yellow powder. It floresces brilliantly under lights. Radium paints which are produced by bombarding luminescent zinc sulphide with particles given off by radio active substances are the most efficient of all luminous materials. There are the paints used on watch and instrument dials. The vehicle required for the purpose is spirit varnish, such as dammar, a plasticised chlorinated rubber varnish, a synthetic resin such as styrol, cyclohexanol, etc. It is important that the vehicle be free from acids which seriously poison the pigment. Phosphorescent paints and coatings require brief exposure to sunlight to become active. The shorter the wave-length of the activating light, the greater degree of luminescence Ultra violet lamps (black light) are very efficient for this purpose.

4269 M.B.S., Hardwar—You may use alcohol in fountain pen ink in place of rectified spirit which is not available in your locality.

4274 B.C.C., Lakhisarai—We are not aware of anything known as junction sindur.

4283 K.L.S., Mandsaur—For emery and sand paper making machines enquire of Volkart Bros., 8, Netaji Subhas Road, Calcutta and Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta. Needle making machines are not available at present. You however enquire of Baird Machinery Co., Bridgeport, Connecticut, U.S.A. You may start tincture and extract manufacture.

4284 A.F.B., Gadag—Process of manufacturing distilled water will be found in January 1948 issue of Industry. For distilling apparatus enquire of Adair Dutt & Co. Ltd., Stephen House, 4, Dalhousie Square, Calcutta.

4285 T.K.S.N., Nagapattinam—Process of manufacturing assafoetida and cloth printing paste will appear in due course.

4287 G.S.B., Umrer—We have no book on hosiery manufacture. No article on hosiery manufacture appeared in Industry.

4288 G.M.F., Mangora—Before starting the periodical you have to take permission from local Government. Then you have to secure permit for paper. For obtaining permit for papers you may write to the Assistant Secretary, Ministry of Industry and Supply, New Delhi.

4289 V.P.R., Tirupur—Process of bleaching mohua oil is not available.

4290 N.R., Bombay—For snow of foreign countries enquire of Burroughs Wellcome & Co., Ltd., Cook's Bldg., Hornby Road, Bombay and Martin & Harris Ltd., 9, Lall Bazar Street, Calcutta.

4296 O.C., Jalpaiguri—Refer your query to The Indo-Japanese Commercial Co., Umriga Bldg., Bombay.

4297 R.N.B., Calcutta—Process of gilding book margin will appear in due course.

4308 R.S., Agra—Brown colour of phenyle is due to non-saponification of soft soap. However you may keep the phenyle for some days when it will change to black.

4311 A.R., Bali—For fountain pen parts enquire of the following firms: F.N. Gooptu & Co., 12, Belliaghatta Road, Calcutta and National Fountain Pen Works, 32, La Touche Road, Lucknow.

4312 P.K.S., Davangere—Process of manufacturing fireworks and biscuits will be found in Home Industries published from this office, price Rs. 3/6/- including postage. For tin cans enquire of Bengal Tin Box Mfg. Co. Ltd., 1 Jadu Nath Mitter Lane, Calcutta 4. Tin can making machines may be had of Alfred Herbert (India) Ltd., 13-3, Strand Road, Calcutta.

Tin printing machines may be had of John Dickinson & Co. 6, Clive Row, Calcutta. For cardboard making machine enquire of Francis Klein & Co., Ltd., 1, Royal Exchange Place, Calcutta. Small glass phials may be had of Calcutta Glass & Silicate Works, 9. Kundu Lane, Calcutta; Glass Producers Ltd., 56, Belgachia Road, Calcutta and New Indian Glass Works Ltd., 7. Rowdon Street, Calcutta.

4313 S.A.A., Raipur—You may use molasses as binding agent for making coal bricks. For machines enquire of Alfred Herbert (India), Ltd., 13-3, Strand Road, Calcutta.

4315 A.N.P.C., Kaveripatnam—Mantles are made of artificial silk yarn. Process of manufacturing mantles will be found in February 1949 issue.

4323 G.K.D., Patna—You may consult a book regarding precious stones.

4323 G.K.D., Patna—You may consult Technology and Manufacture of Printing Ink by G. N. Sarma published from this office, price Rs. 3/6- including postage.

4324 G.C., Jullundur City—Following is a formula of ink for writing on celluloid: Tannic acid 10 parts; ferric chloride 10 parts; acetone 100 parts. Dissolve the tannic acid and ferric salt separately, each in one half of the acetone, and then mix the two solutions.

4328 S.P., Ballia—Process of manufacturing sodium carbonate and caustic soda from reh will appear in due course. For permit for coal write to the Assistant Secretary, Ministry of Industries and Supplies, New Delhi.

4333 V.P., Karad—Waste left behind after manufacturing chalk crayons may be utilised in mixing with fresh lump. You should use pigment colour for manufacturing chalk crayons.

4335 D.B., Jodhpur — For machines for starting a cotton and hair belting factory enquire of W. H. Brady & Co., Ltd., Churchgate Street, Fort, Bombay.

4336 N.S.P.B., Kathmandu—Sugar is manufactured from Gur by means of a centrifugal machine. Gur is crushed by means of a pug mill and put in the machine. Now the machine should be driven when sugar crystals will stick to the machine seperating molasses. We have no book on sugar manufacture.

4340 P.E.W., New Delhi — Process of manufacauring lustre polish will appear in due course.

4347 H.R., Budge Budge—In order to rectify the defect of the soap manufactured go on adding water and boil till you get a homogeneous mass.

4348 J.G., Deoghar—It is not possible to manufacture needle on small scale. You may manufacture vermilion according to the formuas published in Home Industries. You may consult Indian Perfumes, Essence and Hair Oils and Manufacture of Soap—both the books published from this office and price Rs. 3/- each. We have no book on candle manufacture

4349 N.H.N., Uganda—Formulas you require, will appear in due course.

4352 K.C.S., Lashnar—For canvas enquire of Calcutta Canvas Mart, 22, Rupchand Dutta Street, Calcutta and Bird & Co., Chartered Bank Bldgs, Netaji Subhas Road, Calcutta. For rubber working machines enquire of Alfred Herbert (India) Ltd., 13-3, Strand Rd., Calcutta.

4357 G.M.L., Gaya—You may refer your query to the Symposium Publicity & Propaganda Service, Post Box 16607, Calcutta.

4358 J.N.G., Deoghar—See under No. 4348. You may consult Cotton Dyeing and Printing, published from this office, price Rs. 3/6 including postage.

4359 S.K.B., Agra—Process of manufacturing artificial gold and linoleum will appear in due course. For pocket typewriter enquire of Albion Typewriter Co., 11, British Indian St., and Asiatic Typewriter Co. 6, Hastings St., all of Calcutta.

4360 M.B., Hapur—For pottery machines enquire of Kusum Engineering Co., Ltd., 25, Swallow Lane, Calcutta. We have no book on pottery. You may however consult Modern Pottery Manufacture by H. N. Ghose, published by Ceramic Publishing Co., 1, Church Road, Bhagalpur.

4361 I.B.M., Kajrana—Questions on industrial and technical subjects are replied by post on receipt of -/8/- annas stamps for each question.

4366 M.C.I.C., Gulbarga—Process of manufacturing synthetic perfumes will appear in an early issue of Industry.

4367 O.S.H., Feni—Process of manufacturing tincture, extracts etc. will be found in Pharmaceutical Preparations, published from this office price Rs. 3-7 including postage. We are not aware of any such concentrated tinctures. For absorbent cotton making machines enquire of W. H. Brady & Co. Ltd., Mercantile Bldgs, Lallbazar, Calcutta.

4368 K.M.S., Hyderabad — Formulas for raskapoor, hingul, etc., will appear in due course.

4377 N.C., Sevalia — For string making machine enquire of Britannia Engineering Co. Ltd., 28. Dalhousie Sq., Calcutta.

4382 S.S., Harda—Formulas of photographich developer appeared in November, 1948, issue of Industry.

4386 M.R.C., Dharamsala — Process of manufacturing chalk crayons will be found in Prospective Industries, published from this office, price Rs. 3/7/- including postage.

4389 T.A.C.W., Madras—Process of manufacturing toy balloons appeared in August, 1948, issue of Industry.

4391 V.M.D.P.S., Tanjore — See under No. 4389, above. For an expert you may advertise in newspapers.

4392 M.S.V., Hariana—We have no book on Ice making. You may however enquire of Thacker Spink & Co., (1933), Ltd., 3, Esplanade East, Calcutta and Standard Literature Co. Ltd., 13/1, Old Court House St., Calcutta. for a book on ice making.

4393 H.L.C., Jullunder City—A formula of slate pencil appeared in Ocober, 1948, issue of Industry.

4394 N.B.S., Belwada—See under 4389. Detailed process of manufacturing rubber baloons will be found in Manufacture of Rubber Goods, published from this office, price Rs. 3-7 including postage.

4399 I.D.S., Dehra Dun—You may consult Safety Matches and their Maufacture, by K. C. Das Gupta published from this office, price Rs. 4/7/- including postage. Match making machines may be had of Harima Engineering Works, 69/1, Belgachia Road, Calcutta.

4400 H.B.S., Jamshedpur — Sheet metal working machines may be had of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta. Wirenail making machines may be had of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta. For foundry machines enquire of Morton Evants & Co. Post Box. 1230, Bombay and Francis Klien & Co., Ltd., 1, Royal Exchange Place, Calcutta.

4402 M.D.H., Lalpur—Recipes of ointment and patent medicines will be found in Pharmaceutical Preparations, published from this office, price Rs. 3/7 including postage.

4403 U.A., Poona City—Raw rubber or para rubber sheets are used as patches in repairing motor tubes. Then these are vulcanized.

4404 P.C.G., Indore—Wool fat may be had of B. K. Paul & Co, Ltd., 1 & 3, Bonfield Lane, Calcutta and paraffin wax may be had of Bansidhar Dutt, 126, Khongrapatty Street. Calcutta.

4405 K.G.G., Lucknow—Moisten camphor powder with alcohol and make tablets with the help of a tablet making machine.

4406 S.H., Shikarpur—Process of manufacturing sodium carbonate appeared in July, 1948, issue of Industry.

4412 M.A.K., Petal—You may add ultramarine to the soap after removing from fire.

4415 M.L.R.P., Gwalior — Stencils are made of thin sheets of tin. These are seldom made of aluminium sheets. Colours may be had of Ciba (India) Ltd., Jehangir Bldgs., Esplanade Rd., Fort., Bombay, and National Aniline & Chemical Co., Patel House, Church Gate Street, Fort, Bombay.

4421 M.M.M., Dunuka — Paper making machines are not available in India. You may however enquire of Volkart Bros., 8. Neta Subhas Rd., Calcutta.

4423 M.L.A., Delhi—Refer your query to the Assistant Secretary, Ministry of Industri[es] and Supplies, New Delhi.

4427 U.T.S., Toungoo—Process of manufa[c]turing sodium silicate will be found in Chemic[al] Industris in India, published from this offic[e] price Rs. 3/7 including postage. Cerium a[nd] magnesium are natural products. It is n[ot] possible to manufacture lozenge from sugarca[ne] juice.

4443 P.B., Dhampur—Following is a fo[r]mula of blue black ink powder:—Methyle[ne] blue 4 oz. Methyl violet ½ oz. Gum acac[ia] powder ½ oz. Sugar ½ oz. Boric acid 1 dr. Mi[x]. Now add a little water to the powder and ma[ke] paste and dry in the sun when completely d[ry] break the mass to small granules which shou[ld] be fed to a tablet making machine when y[ou] will get ink tablets of required quality.

4447 P.C.W., Agra—Cantt—A formula [of] hair fixer will appeaar in due course.

4450 R.K.P.S., Benares—You may start [a] sugar factory or vegetable ghee factory wi[th] the capital you have. Oil seeds and sugar ca[ne] are available in your place.

4452 B.L.S. Aligarh—We have no book [on] electroplating of aluminium. The process th[at] appeared in January, 1949, issue of Industry [is] the only process adopted in colouring aluminiu[m].

4453 D.S.H., Dehra Dun—Following is [a] formula of disinfecting fluid:—Rosin 85 lb[s]. Castor oil 20 lbs. Caustic soda lye 30°Be 60 lb[s]. Light creosote oil 100 lbs. Melt the rosin, a[dd] the castor oil and when thoroughly incorporat[ed] and while the mixture is still warm add t[he] caustic soda lye and boil until the whole [is] saponified. Add a quantity of water from ti[me] to time if required. Lastly dissolve the so[ap] thus formed with 3 to 4 times its volume [of] water and allow to cool. When nearly co[ol] add the creosote and stir. This gives the disi[n]fecting fluid of good quality.

4456 M.C., Madras—Process of glue ma[k]ing appeared in February, 1948 issue of I[n]dustry. Following is a formula of nail polis[h]: Celluloid film cut small—200 gr. Amyl aceta[te] 5 oz. spirit red 80 gr. Clean the celluloid fil[m] by soaking it soda solution for 2 or 3 hou[rs] then scrape with a blunt knife, dry in the su[n]. Then cut it into small pieces and weigh out a[nd] put in the mixture of acetone and amyl aceta[te] in a well stoppered bottle. Then add t[he] colour. Keep aside for a day or two th[en] strain and bottle.

4460 S.L.G., Dinhata—Yes, you may sta[rt] hosiery factory and candle factory. F

hosiery machines enquire of W. H. Brady & Co. Ld., Mercantile Bldgs., Lalbazar, Calcutta. Candle making machines may be had of Small Machinery Mfg. Co., 22, R. G. Kar Road. Calcutta.

4461 T.S.R., Davangere—Collapsible tubes may be had of Metal Box Co. of India Ltd., B-2, Hide Road, Kidderpore, Calcutta. For Indian Materia Medica by K. M. Nadkarni, enquire of P. O. Box 3558. Bombay 4. For jute twine making machines enquire of McLeod Co. Ltd., 28, Dalhousie Square, Calcutta.

4467 J. M. C., Dindigul—For manufacturing milk powder you should adopt film drying system. For vacuum pan and other machineries enquire of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta.

4468 N.D.M., Ballia—Process of developing and printing photo film will appear in usual time. You may consult Manufacture of Batteries, published from this office , price Rs. 3/7 including postage

4469 T.R.L., Panipat—Co-operation is a principle which seeks to ensure the maximum possible advantage of organisation without endangering individual freedom. It also seeks to promote maximum efficiency without sacrificing social equality. For further information you should read some books on co-operative society organisation. For this enquire of The Provincial Industrial Co-operative Association Ltd., 9, Bake House Lane, Fort, Bombay.

4470 H.L.S., Muzaffarpur—A formula of incandescent mantle appeared in February 1949 issue of Industry. Pass kerosene oil through a bed of bauxite.

4473 S.P., Chandansi—It is not possible to describe the process of hydrogenation in this column. Process will be found in Vegetable Oil Industry. published from this office, price Rs. 3/7.

4479 S.R.G.S., Calcutta—A formula of phenyle will be found under No. 4453 above.

4493 B.N.K., Madras—You have to use machine for manufacturing jute yarn. For machine enquire of Britannia Engineering Co. Ld., 28, Dalhousie Square, Calcutta.

4500 M.B., Darjeeling—In order to prevent sweating of drops roll them in China clay or Kaolin powder. Wire nail making machines may be had of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta. Before starting the factory you should study the market carefully as regards demand and supply.

4501 A.C.K., Krishnagar—The industries mentioned by you, may be started with small capital or cottage industry basis by refugees. An article on toy manufacture appeared in April 1947 issue of Industry. You may consult Manufacture of Soap, published from this office, price Rs. 3/7. We have no book on rope making, net making and Asan making.

4505 K.C.T., Amritsar—Process of manufacturing lead acetate and lead nitrate will appear in due course.

4510 R.B.B., Patiala—You may refer query to the supplier of engine. Boil sugarcane juice with milk when the juice will be clarified to great extent. Molasses should be poured in centrifugal machine when crystallisation has set in.

4512 B. S., Sahibganj—Power alcohol may be manufactured from molasses. For further particulars write to the Minister of Industries and Supplies, New Delhi.

4513 J.L.J., Ambala—Wrought iron can be annealed but cast iron cannot be annealed.

4519 L.S., Phubra—Process of manufacturing sodium carbonate will be found in July 1948 issue of Industry. For starting sodium carbonate manufacture you have to invest Rs. 15 lakhs. Machines will not be available here.

4520 K.C., Bombay—There is no arrangement for practical training on watch repairing, rubber stamp manufacture and photography. As regards training in soap, you may write to B. Dutta, 3, Mangoe Lane, Calcutta.

4522 I. W., Ellichpur—For straw board enquire of Strawboard Manufacturing Co., Saharanpur and Jaswant Strawboard Mills Ltd., Meerut. Your other query is unintelligible.

4524 M.P., Bilaspur—Process of manufacturing turpentine oil will appear in due course.

4527 B.B.C., Amritsar—For shoe lace stitching machine write to Oriental Machinery Supplying Agency, P-12, Mission Row Extn., Calcutta.

4535 S. E., Bijnor—We have no book on lens making. You may enquire of W. Newman & Co. Ltd., 3, Old Court House Street, Calcutta, and Standard Literature Co. Ltd., 13/1, Old Court House Street. Calcutta. For machines enquire of Adair Dutt & Co. Ltd., Stephen House, 4, Dalhousie Square. Calcutta and Lawrence Mayo (India) Ltd., 11, Government Place East, Calcutta.

4539 Z.C.W., Madras—You may try the following formula of washing soap:—Coconut 26 Srs. Groundnut oil 12 seers, Castor oil 12 seers, Caustic soda lye 37°Be 22 lbs. Metanil yellow 15 grain. Pour caustic soda lye in the oils and stir when it will thicken, dissolve the colour in warm water and pour in the soap and mix thoroughly. Let it settle for 24 hours.

4540 H.D., Cherrapunji—Chalk is a natural product. Chalk crayon is manufactured with chalk and other ingredients. Chalk crayon is used in writing on black board.

4542 K.D.F., Bankur—For selling red oxide of iron you may negotiate with Calcutta Mineral Supply Co., Ltd., 31, Jackson Lane, Calcutta.

4549 K.C., Delhi—Silica sand is natural product which is used in manufacturing glass. For silica sand enquire of Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane, Calcutta.

4552 B.Y., Gaya—Process of manufacturing biscuit will be found in Home Industries,

published from this office, price Rs. 3/7 Paraffin wax is used for sealing. Old issues of Industry are not available.

4558 N.P., Puri—Process of enamelling will appear in an early issue of Industry.

4561 R.K.S., Darbhanga—You may negotiate with the following firms for taking loans:—British India Banking Corporation Ltd., 150, Rashbehari Avenue, Calcutta and Beleghata Banking & Trading Co. Ltd., Beleghata Canal Bridge, Calcutta. For printing machines enquire of John Dickinson & Co., 6, Clive Row, Calcutta and Printing & Industrial Machinery Ltd., Windsor House, P-14, Bentinck Street, Calcutta.

4562 N.G.R., Ahmedabad—For paraffin enquire of Burmah Shell Oil Storage & Distributing Co. of India Ltd., Ballard Estate, Bombay. Melt paraffin wax and pour in the candle moulding machine set with wicks.

4563 H.I., Darbhanga—We cannot supply you formula of any proprietory hair oil. Formulas of hair oil will be found in Indian Perfumes, Essences and Hair Oils, published from this office, price Rs. 3/7.

4565 K.D.K., Lucknow—See under No. 4561. You may refer your query to A. Mittra & Co., 5-2-F, Raja Rajballav Street, Calcutta.

4566 A.K.G., Kathiawar—Process of manufacturing all kinds of catechu will be found in manufacture of catechu, published from this office, price Rs. 3/7.

4570 A.B., Colombo—Formulas and processes of manufacturing margarine, flavours, scents, etc. will appear in an early issue of Industry.

4577 M.C., Multan—Mustard oil cannot be refined so that this can be used in making scented hair oil. Paraffin oil is also known as liquid paraffin, you may cut soap in flakes with the help of a machine. For flake making machine enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

4578 J.P.A., Chapra—You may start a glass factory with Rs. 2 lakhs; a hosiery factory may be started with Rs. 50,000/- only. For starting an oil mill you have to invest Rs. 50,000/-. All these industries have good prospect.

4582 R.P.B., Gangtok—Orange juice may be preserved by adding potassium metabisulphite to this. Proportion should be 1 part in 1000 parts of juice. Ivory goods are made by hand which requires practical training.

4583 J.R., Madras—Watch and timepiece dials are manufactured in the same way as plate glass. Tin printing is done by lithoprinting process which is very elaborate and cannot be described in these columns.

4586 G.R., Madras—For springs enquire of Swami & Co., 40-1, Strand Road, Calcutta and Chicago Engineering Works, 84-A, Netaji Subhas Road Calcutta. You may use cellulose paint on toys.

4587 N.R., Secunderabad—Following is a formula of depilatory soap:—Soap 2 seers; white starch 1 seer; barium sulphide 2 seers. Melt the soap and while in paste form incorporate the other two ingredients in fine po der. Mix intimately to have uniform mass a mould.

4592 M.A.S., Salamatpur—Process manufacturing sponge iron will appear in d course.

4593 P.G., Saharanpur—For old new papers enquire of K. Bhattacharjee, 31-2, H rison Road and S. K. Singha 31-1/B, Harris Road both in Calcutta. Following is a list vegetable product dealers. Arutlal Dharmsi Co., 5, New Chinch Bunder Road, Bomb Hoosen Kasam Dada, 26, Amratolla Stre Calcutta, and Vegetable Products Stor 161/1/1, Harrison Road, Calcutta. For dru enquire of Standard Drum & Bucket Facto 232, Bellasis Road. Byculla, Bombay and I perial Drum Factory, Old Boyco Flour Mil Grant Road, Corner, Bombay. There is substitute for kerosene oil. Address of Natio al Carbon Co. (India) Ltd., is 28, Pollo Street, Calcutta.

4594 G.B., Agra—Formulas of tooth po der appear elsewhere in this issue.

4596 · H.L.C., Gohana—Process of man facturing tannic acid will appear in d course. Tannic acid has good prospect India. You may start a factory wi Rs. 20,000/-.

4609 P.G.M., Calcutta—Following is recipe of tea flavour: Rose oil 4 drops, Ner oil 34 drops, Cognac oil 200 drops, Lemon 1½ oz., Vanillin 5 oz., Ethyl formal 1 lb., Am butyrate 3 lbs. Mix and keep in stoppered bott for use. A small amount of this essence m be sprayed on tea so as to increase its flavo All the ingredients may be had of Paradi Perfumery House, 7, Colootola St., Calcut and Ghose Bros., 50, Ezra Street, Calcutta.

4611 K.P.B., Gaya—You have to invest least Rs. 5 lakhs for starting a cinema hou For industrial books enquire of Thacker Spi & Co. (1933) Ltd., 3 Esplanade East, Calcut and Standard Literature Co., Ltd., 13-1. O Court House St., Calcutta and W. Newman Co., Ltd., 3, Old Court House St., Calcutta.

4612 S.U., Lucknow—For Wire nail ma ing machines, enquire of Oriental Machine Supplying Agency Ltd., P-12, Mission Ro Extension. Calcutta. Following is a formula green marking ink:—Silver nitrate 3 dr. Wat 3 oz., Ammonia q.s. Green dye q.s. The nitra is dissolved in the water and then strong amm nia is added gradually until the precipita which first forms is redissolved. A little gre dye is added for colour. A hot iron is to pressed on the marks for fixing.

4615 D.P.A., Muzaffarnagar — Process manufacturing glue, boot and shoe polishe

alk crayons etc. will appear in due course.

4616 T.C.S., Amritsar—For medical direc-ry enquire of B. K. Paul & Co. Ltd., 1 & 3, nfield Lane, Calcutta.

4621 S.E.W., Shimoga—You may consult ectroplating in Practice, published from this ice, Price Rs. 3/-. For appliances and emicals enquire of Alfred Herbert (India) d., 13/3, Strand Road, Calcutta.

4623 S.H.I., Colombo — Following is a rmula of coffee table:—Fresh cow's milk 20 s. Water 6 lbs. Coffee 24 oz. Sugar 6 lbs. lute cow's milk with the water. Infuse the ixture with 24 oz. of any good coffee. Boil ntly over a mild fire for a few minutes and en strain. Add to the filtrate the refined gar and thicken it by boiling down. Stir ntinually until it is pasty and then pour into buttered mould of tin. Allow to cool and lidify and then cut into pieces of desired ze and weight. They should be immediately nned into tin pots without touching by nds. To use these tablets subsequently ssolve a cube in a cup of hot water and drink.

4627 V.Y.S., Bijapur—Formulas of mark-g inks of all kinds will be found in Manu-cture of Inks, published from this office, ice Rs. 3.

4628 G.R.J.R., Karnal—Heat the oil to °C then add 5 to 10 per cent. commercial lphuric acid and stir. Then keep it undis-rbed for 24 hours. Then filter the oil.

4630 O.M.B.T., Alleppey—Spirit chlorophyl, c. may be had of B. K. Paul & Co., Ltd., 1 & 3, nfield Lane, Calcutta. Process of recondition-g tea will appear in due course.

4631 A.M., Bombay—It is not possible to ange the colour of plastic buttons.

4634 J.B., Bellary—Process of manufac-cturing scented betelnut and coffee tablets ithout sugar and milk will appear in an early sue of Industry.

4637 R.D.B., Ajuala—Process of manu-cturing vellums will appear in an early issue Industry.

4642 A.S., Ramarao. Cocanada—Process of anufacture of all kinds of soaps will be found Manufacture of Soap, published from this fice, price Rs. 3/-.

4648 H.B., Patna—Process of manufactur-g ice cream is as follows:—Powdered sugar—4 oz. Milk powder—24 oz. Arrowroot—8 oz. owdered gelatin—2 oz. Vanillin sugar (1: 50.— oz.). Mix and divide into packets of 4 oz. fficient for one pint of milk, or a mixture of ilk and water.

4649 S.N.. Delhi—Following is a formula of epilatory cream:—Barium sulphide—4 oz. etrolatum 30 oz. Supermaceti—10 oz. Stearin— oz. Tinc Iodine—1¼ oz. Potassium carbonate—1¼ oz. Water—40 oz. Lavender or citronella oil 1 oz. Melt the petrolatum, spermaceti and stearin over water and stir into it potassium carbonate dissolved in the water. Then incorporate the barium sulphide, tinc iodine and essential oil. Thread ball making machines may be had of Oriental Machinery Supplying Agency. Ltd., P-12, Mission Row Extension, Calcutta. Wants to be put in touch with the importers of Che-mical Diamonds and soda water fountains in India. Other formulas you require, will ap-pear in due course.

4658 H.P., Howrah—Process of manufactur-ing aluminium powder and paint will appear in due course. You may consult Aluminium Paint and Powder by J. D. Edward and Paint Technology by F. N. Heaton.

4660 R.G., Deoghar—We have no book on colour manufacture.

4662 H.C., Tinsukia—We are not aware of the formula of smokeless gunpowder.

4665 B.C., Banaras—For securing export license you may write to the Controller of Ex-ports, New Delhi. For telegraphic address you may write to the local Post Office.

4666 C.M., Guntur—Process of cultivating tobacco, cabbage, cauliflower, etc. will appear in due course.

4667 M.P.S., Samastipur—Process of manu-facturing pencil will be found in Industry Prize Articles, published from this office, price Re. 1-8. For pencil making machines enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mis-sion Row Extension, Calcutta.

4668 R.C.P., Hoshiarpur—Formulas of bindi powder, solid phenyle, etc. will appear in due course.

4669 R.P.V.E., Ludhiana—Refer your query to A Mitra & Co., 5-2-F. Raja Rajballav Street, Calcutta.

4671 J.P.W., Rajahmundry—You require ebonite rods which may be had of Industrial Trading Agency, 72-80, Nagdevi Cross Lane, Bombay 3. and Universal Traders, 92, Harrison Road, Calcutta. For irridium enquire of Hamil-ton & Co., Ltd., 8, Old Court House Street, Calcutta.

4672 T.E.N.S., Trichur—Process of electro-plating will be found in "Electroplating in Prac-tice" published from this office, price Rs. 3.

4673 R.C.B., Sonarampur — As regards Mogalkhair you should try recipe No. II under Mogalkhair. As regards Janakpuri Khair, you should try the recipe No. I under papri Khair. Analysis will not help you in preparing the Khairs.

4680 O.P., Shivpuri—Following is a formula of depilatory powder:—Barium sulphide—3 drams; Zinc oxide—12 drams; Carmine—2 grain Mix thoroughly and keep in airtight bottle.

4681 B.B., Nepal—There is no institute where practical training is given on biscuit manufacture. Best course for you will be to advertise for an expert in biscuit manufacture. Biscuit making machines may be had of Small Machinery Mfg. Co., 22, R. G. Kar Road, Calcutta. Following is a list of biscuit factory, Barua Bakery, 123A, Dharamtala St.. Britannia Biscuit Co., 5, Dalhousie Sq., Lily Biscuit Co., 3,

Ramakanto Sen Lane, Ultadanga and Santosh Biscuit Co., 8, Sukea Street, all of Calcutta.

4683 K.O.G.B., Nigeria—All the addresses will be found in Industry Year Book and Directory, published from this offices, price Rs. 12/-.

4685 A.C.M.C., Tarn Taran—Address of nurses and midwives of India are not known to us.

4686 M.K.C.P.W., Yanan—Process of earo graph printing will appear in due course.

4688 B.K.S., Cuttack—Vanaspati ghee is prepared from groundnut oil, cotton seed oil, coconut oil etc. Process is very long and elaborate, which cannot be described in these columns. Process will be found in Vegetable Oil Industry, published from this office, price Rs. 3/-.

4690 F.P.S., Champa—Recipes of patent ointment are not available. But similar recipes will appear in due course.

4691 S.V., Lucknow—Process of fixing celluloid sheets on metal will appear in an early issue of Industry.

4692 I.P., Ambala Cantt.—It is not possible to deodorise and decolourise rosin. Rosin may be had of B. Desai & Co., Patel House, Church Gate St., Fort, Bombay, and Bhawan Das Sud & Sons, 11, Bank Street, Fort, Bombay and Bombay Rosin & Turpentine Co., G. P. O. Box No. 1512, Bombay. Addition of sodium carbonate will harden the soap. Process of manufacturing all kinds of soaps will be found in Manufacture of Soap, published from this office, price Rs. 3/-.

4694 K.T.C., Nagpur—Tail hairs should be sorted according to their length and should be washed and cleaned like bristles. Wants to be put in touch with the dealers in cattle tail hairs and other hairs.

4695 T., Katmandu—Book on sugar manufacture is out of print.

4699 B.P.S., Kathmandu — We have no book dealing with vegetable dye manufacture.

4700 V.V.R.M., Bellary—You may consult Home Industries, price Rs. 3/- and Safety Matches and Their Manufacture. Price Rs. 5/- both the books published from this office.

4707 M.B., Darjeeling—You may try the formula published in January, 1949, issue of Industry. You may use ink blue in place of acid blue. All the ingredients may be had of Bansidhar Dutt, 126, Khongrapatty Street, Calcutta, and Fuzlhusein & Bros, 44, Armenian Street, Calcutta. Following is a formula of rubber stamp ink:—Aniline violet 4 oz., Glycerine 2 pints; Gum arabic mucilage 2½ pints. Dissolve the dyes in the water, add the other ingredients and mix well together.

4708 M.H., Natore—Process of colouring gums and rifles will appear in an early issue of Industry. No machine will be required for the above process.

4722 P.N.N., Kanpur—Formulas and recipes of ointments, eczema cure etc. will appear in due course.

4726 G.O.C., Amritsar—Process of manufacturing imitation tabashir will appear in due course.

4729 R.S.A., Jalaun—For tractors enquire of The New Engineering Co. 6, Nafar Kundu Road, Calcutta. For irrigation pumps enquire of Killick Nixon & Co., Ltd., Home Street, Bombay.

4736 P.G.S., Jullundur City—For hair dyeing oil you may try the following process. Take 2½ seers sesamum brayed to a paste. 5 seers emblic myrobalam free from seeds and 10 seers sesamum oil. Put the three ingredients together in an iron vessel and place in the sun for one month. Strain out only 5 seers of the soaking oil and put in a fresh lot of 5 seers sesamum oil. Leave aside for one month; strain out only 5 seers sesamum oil. Leave aside. Repeat the operation for 6 months. Then srain for one month; strain out again 5 seers of oil. the whole of the oil and mix together the former quantities. Put in a covered vessel. oil prepared in this way serves as a good hair dye. Smear the head with it every day half an hour before bath. In course of six months hair will be dyed black and no grey hair will be noticeable.

4739 R.B.S., Gaya—Your query is not in our line. You better consult a doctor.

4744 D.B., Sambalpur—In silvering mirror two solutions are required namely reducing solution and silvering solution. Following is a recipe of reducing solution: In 1 oz. of distilled water dissolve 12 gr. of rochelle salt and boil, while boiling add 16 gr. of silver nitrate dissolved in 1 oz. of distilled water and continue boiling for 10 minuts more; then add more distilled water to make 12 oz. Following is a formula of silvering solution: Dissolve 1 oz. of silver nitrate in 10 oz. of distilled water, then add liquid ammonia until the brown precipitate is nearly but not quite all dissolved, then add 1 oz. of alcohol and sufficient water to make 12 oz. To silver take equal parts of the two solutions and mix thoroughly and lay the glass face down, on top of the mixture while wet after it has been carefully cleaned with soda and well washed with clean water. About 2 dr. of each will silver a plate 2 inches square. The dish in which the silvering is done should be only a little larger than the plate. The solution should stand and settle for 2 or 3 days before using and will keep good for a long time.

4747 A.K.N., Kuhuri—For preparing wine yeast, take 1 dram wine. one tablespoonful of sugar and one teaspoonful of flour. Mix together in a strong bottle and soundly cork. It is then thoroughly shaken and left in a warm place. It is ready for use when the mixture froths up on shaking, generally in 24 hours.

4748 D.G. Calcutta—A formula of gum will appear in an early issue of industry.

4749 H.R., Tatanagar—Coconuts are husked then wetted in water. The fibres are extracted and cleaned and spun either by hand or in spinning wheel. There are several types of spinning wheels in use. This industry is carried on in South India. Detailed information will be found in Utilisation of Common Products, published from this office, price Rs. 3/-.

4750 P.C.M., Sholapur—Process of manufacturing boot polish and chalk crayons will be

found in Prospective Industries, published from this office, price Rs. 3/-. Process of manufacturing all kinds of confections will be found in Manufacture of Confectionery, published from this office, price Rs. 3/-.

4753 A.C.S., Pisangan — For generating electricity and thereby lighting your house you may use a series of storage batteries

4754 L.K., Wakema—We cannot suggest you anything unless we are aware of the things you want to treat. Formulas of Phenol ester, acetic anhydride, etc. will appear in an early issue of Industry.

4759 N.N.S., Patiala—For required bottles enquire of Imperial Glass Works, 9, Ezra St., Calcutta. Calcutta Glass & Silicate Works, 9, Kundu Lane, Calcutta, and Victoria Glass Works, Ghoosery, Howrah.

4760 S.H.. Dacca—Recipes of tonics and ointment will be found in Pharmaceutical Preparations, published from this office, price Rs. 3/. However, recipes will appear in due course.

4761 M.I., Samastipur—Thank you for your valuable suggestion.

4767 K.S.R., Kasargad—Process of paint removing will appear in due course.

4770 B.B., Barabanki—No small machine for hydrogenation of oil is available. Hydrogenation of oil will be found in Vegetable Oil Industry, pubilished from this office, price Rs. 3/-. Process of manufacturing matches will be found in Safety Matches and their Manufacture, published from this office, price Rs. 5/-.

4773 T.S., Dehra Dun—Process of manufacturing Vegetable ghee will be found in Vegetable Oil Industry, published from this office, Price Rs. 3/-.

4774 P.K., Coimbatore — Formulas of marking ink, candles will appear in due course.

4781 B.R.D., Giddarbahe—Casein may be manufactured from skimmed milk. Process of manufacturing casein will be found in Milk and Milk Products, published from this office, price Rs. 3/-.

4782 U.T.B. Bombay—Process of manufacturing enamel paint and glycerine will appear in due course.

4783 V.M., Aligarh—You may try bleaching lotion formula of which follows: Lactic acid 6 parts, Acetic acid 4 parts, citric acid 8 parts, ethyl ether of diethylene glycol 20 parts, alcohol (90 p. c.) 20 parts, perfume to suit 1 part; water 140 parts. Dissolve the citric acid in the alcohol and the acetic acid in the ethylene glycol. Mix the lactic acid with the water, add the citric acid solution and mix again, add the acetic acid solution. Rub up the perfume with a little purified talc and add this last. Allow to stand over night and filter. As this preparation is quite strong and may arouse irritation, apply cold cream after use.

4786 J.J.I., Agra—It is not possible to increase the melting point of hard paraffin.

4787 L.B.N., Jhansi City—All the chemicals you require may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta. After washing the cloths dip them to dilute laundry blue soution when you will get whiter cloths. Address of American Consul-General is 9-10, Esplanade Mansion, Calcutta, address of British Consul-General is Harrington Street, Calcutta.

4789 B.S., Shillong — You have to invest Rs. 50,000/- for starting either canning or toilet soap manufacture.

4790 W.R.B., Kasauli—For technical books enquire of W. Newman & Co., Ltd., 3 & 4, Old Court House Street, Calcutta and Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta. Process of manufacturing menthol, crystal, thymol, etc. will appear in due course.

4792 B.L.N.. No address—For milk powder making machine enquire of Edward Keventers Ltd., 11/3, Lindsay Street. Calcutta.

4795 H.C., Calcutta—Process of manufacturing salammoniac bar will appear in due course.

4796 C.J.D., Trichur—Process of staining wood will appear in an early issue of Industry.

4797 M.K., Mokalsar — Process of manufacturing tiles. pottery etc. will appear in an early issue of Industry. An article on plastic industry appeared in December , 1948 issue of Industry.

4802 N.B.D., Calcutta—Process of manufacturing Kimam and Zarda will be found in Indian Tobacco and its Preparations, published from this office, price Rs. 3/-. You may try both the formulas. Formula under No. 3699 will be better.

4805 M.K.Mc., Coimbatore—Your enquiry is unintelligible.

4806 A.M., Peshawar—Process of manufacturing bakelite appeared in December, 1948, issue under plastic industry.

4809 R.P.P., Mundur City—An exhaustive article on tanning will appear in April, 1949, issue of Industry. Process of curing reptile skin published in January, issue is up-to-date method applied in modern factories of Western countries.

4810 K.G.K.R., Nuzvid—Moida is manufactured from wheat by means of machines. Outer layer of wheat is removed by decorticating machine and then ground to fine powder.

4811—L.P.. Puri—Bottles may be had of Calcutta Glass & Silicate Works, 6, Kundu Lane, Belgachia, Calcutta; Calcutta Glass Stores, 3, Mangoe Lane, Calcutta and Nandy & Co., 23/24, Radhabazar Street, Calcutta. Glass tubes, ampoules, etc., may be had, of Modern Srientific Glass Works, 130, Radha Bazar St., National Glass Blowing Works, 9. Nayan Chand Dutt Street, and Premier Scientific Glass Co., 26-2A, Prosonno Kumar Tagore St., all of Calcutta. Scientific Apparatus may be had of Adair Dutt & Co. Ltd., Stephen House, 4, Dalhousie Sq., Calcutta. For technical books enquire of Thacker Spink & Co., (1933) Ltd., 3, Esplanade East, Calcutta.

Review of Books

POTTERY MANAGEMENT. Publishd by Ceramic Publishing House, Church Road, Bhagalpur. India. Price Rs. 7/8, pages 185.

It has been proved beyond doubt that ceramic industries are key industries, but for which the modern developments of other industries are impossible. And it is gratifying to note that India offers most favourable conditions for the development of this important industry. It requires only scientific knowledge and the economic technique for their proper development.

The book, under review, makes a comprehensive survey of the various problems relating to pottery management, makes a searching analysis of the hurdles that are hampering the progress of this important industry. His opinion is evidently the fruit of patient study and research in this line and bears the unmistakable stamp of mature practical experience in this line.

Chapter I deals with labour and efficiency. The efficiency of labour is closely interlinked with industrial progress. So it should be our primary object to train up workers under modern scientific methods from the very beginning of their career, so that efficiency of their work may be improved.

The success of an industrial enterprise depends for the efficiency of the organisation, on (1) suitable site (2) labour facilities, (3) supply of raw mataerials, (4) market facility. The writer has taken all these factors into account in the second chapter.

Chapter IV of this book deals with niceties of factory management and Chapter V draws up a detailed scheme, brings under its purview scheme of a fire brick work, scheme of stone ware factory and scheme of a porcelain factory.

Indian capital is not shy. But there is lack of proper men to advise and guide in this line. The fact is that technical experts are not available in sufficient numbers. Factories that exist now in India are still managed by experts of old days, who are reluctant to admit students of ceramics and share with them the secrets and technique of industrial organisation. It is meet and proper that they should change their outlook and begin to train up youngmen, so that they may have an opportunity to develop the latent potentialities of this important industry.

ROAD TRANSPORT IN INDIA. Published by the Universal Publishers Ltd., Lucknow, (India). Pages 130, price Rs. 2/-.

Behind the road transport system in India, one searches in vain any definite scheme and planning. In fact, no benefit may be derived out of road transport, unless it is adjusted to the agricultural and industrial needs of our country.

The author of the book "Road Transport in India" rightly points out that Indian villages look like so many scattered human concentrations. And she is perhaps the only country where the most primary occupation is least occupied with its vital necessity. The author righfly affirms that there should presently be an end of this sorry state of affairs if she has to make any headway in the sphere of agriculture or industry. Roads, we are aware, constitute a great aid to agricultural prosperity of the country. The expansion of roads connecting the scattered villages, will naturally lead to larger agricultural production and also facilitate agricultural marketing. Besides, cottage industries in rural areas which are languishing owing to lack of opportunities for agricultural marketting will receive a new lease of life as a result of adequate transport system.

A scientific approach should be made to the problem of road transport. The chapter entitled "Basic problems" will show certain fundamental anomalies & maladjustment. Maladjustments largely originated out of conflict between road-owner and road haulier decentralised administration. Bad roads also account for maladjustment in traffic.

Road transport is being handicapped not only due to the inherent problem but also due to many internal vices. They should be quickly removed for the growth of healthy transport system. They are as follows:—Incapacity for internal economics, internal competition, loss of capital etc.

The rail-road competition, in particular, has highly undermined the progress of a healthy road transport system. The author is of opinion that only state control and a policy of progressive nationalisation of the transport system can effectively solve those numerous problems. We share his view. One who intends to have a clear idea of the transport-system in India, may find in it a valuable and reliable guide.

INDIA ON PLANNING. Published by the Globe Library, Book-Sellers & Publishers, 2, Shyamacharan De Street, Calcutta, 12, Pages 238, price Rs. 7/-.

Mr. A. K. Shaha, author of India on Planning, has evidently reaped a rich harvest of practical experience from U.S.S.R., which has achieved miraculous progress in the sphere of industry.

So any suggestion that may come from him deserves our closest attention. Our opinions. however, may vary with, regards to his main thesis. The main proposition that runs throughout the book is that scientific planning is indispensable for the industrial progress of every country and that dependence on foreign imports, very often leads to

virtual economic enslavement, hampering creative potentialities of her own people. The above proposition surely embodies a large element of truth.

What attracts one, is the author's sincerity and courage of his convictions. He has unflinching faith in the capacities and capabilities of his country men. He believes that with diffusion of education among peasants and labourers, they themselves will be able to shape the destiny of their own country. Why should we go in for imports, when our own countrymen can develop with their own resources is his repeated assertion.

The book is informative and illuminating and a source of inspiration to those in particular, who have good of their own country at heart. It furnishes us with the inspiring history of the brilliant and spectacular progress of Soviet Russia. The chapters to which we particularly draw the attention of our readers are as follows:—Liquidation of illiteracy; problem of industrialisation in India; planning in education; planning of coal industry in India, woman and country, child and nation.

ADVERTISING THAT SELLS. Published by Matson's Publicaations, St. Eves, Hunts. Pages 175, price 10s. 6d.

Advertising is one of the finest and most delicate techniques of business organisation and the success or failure of any enterprise, in a large measure, depends on the way in which this instrument is handled. Genuine and intrinsic worth is surely the essential prerequisite of any business or industrial enterprise. But advertisement counts a great deal. So a book on this fine art of Advertising is always an asset to any industrial organisation. Lionnel's Stebbing's book on advertising may furnish the advertiser with a clue to the subtleties and secrets of this delicate art. The author shows how the effecttiveness of advertisment depends on the selection of right sales theme, how the appeal depends upon lay-outs, use of humour, colour and pictures.

This book is expected to be particularly useful to businessmen, mailorder and direct mail advertiser, advertisement managers, copywriters and free lance writer. A cursory glance into the contents will show the degree of usefulness and utility of this book. They may be briefly stated as follows:—Headlines that sell-and why; producing effective layouts, how to use picture, writing business-building slogans, colour in advertising, so on.

We highly commend this book to the interested readers.

NOTICES & REVIEWS

(Manufacturers sending specimens and samples of their products for notice and review may please note that no notice is published of medical preparations and allied substances in this section.)

TAILOR'S MEASURE TAPE.

We have received from Vadilal C. Sheth, 50, Canning Street, Calcutta 1, one sample of tailor's measure tape of good quality.

NAIL POLISH BRUSH.

We have received a few samples of nail polish brush of good quality from Angel's Manufacturing Co., 89, Cloth Market, Delhi.

DIARY FOR 1949.

We have received from Basusree Cinema, Bhowanipur, Calcutta one pocket diary for 1949, and one copy of nicely printed souvenir describing their first anniversary.

BARBER'S RAZOR.

We have the pleasure to receive from Gupta Trading Company, Kanongoyan Street, Meerut City one "Telephone" brand hollow ground razor made of superior quality steel. The workmanship and finish of the razor are excellent.

NEW YEAR CALENDERS.

We have the pleasure to receive new year calendars from the following:—Symposium Publicity and Propaganda Service, Publicity Consultant, Block Maker and Printer, 22, R. G. Kar Road, Calcutta 4; Bengal Cardboard Industries & Printers Ltd., 164, Cornwallis Street, Calcutta; Malu Chemical & Industrial Co., Gulbarga; Samraj Arts, 354, Mint Street, Madras 1; Bholanath Paper House Ltd., 21, Beadon Street, Calcutta 6; Jivan Chemical Works, Tandalja, Via Bodeli, G. B. S. Ry.; and Clyde Fan Co. Ltd., 21-2, Chowringhee, Calcutta.

METAL MARKET.

We have the pleasure to receive the Annual Number of Metal Market Review, a publication especially devoted to metal industry and trade. The issue under notice contains several interesting and informative articles from the pen of distinguished scientists and industrialists of India. It is published monthly from 38, Strand Road, Calcutta. Its annual subscription is Rs. 12/- only.

TRADE ENQUIRIES

(To communicate with any party write to him direct with name and address given below mentioning Industry).

4446 Pal Chemical Works, 4-B, Peary Das Lane, Calcutta 6. Want to be put in touch with the suppliers of fine sandal wood powder.

4589 Chakravorty & Das, 2/1A, Nebu Bagan Bye Lane, Calcutta 3. Want a financier with Rs. 5000/- for machinery business.

4619 Bhubanmohini Free Industrial School, 6, Chaulpatti Lane, Beleghata, Calcutta 10. Wants to be put in touch with the suppliers of spun woollen yarn for weaving purposes.

4638 R.U., Krishna. Anand Bagh, Patna City. Wants to be put in touch with the suppliers of paper cups and lids for selling icecream.

4690 Dehra Trading Corporation, 142, Lakkhi Bagh, Dehra Dun. Want to be put in touch with some vegetable dealers.

4695 Gupta Brothers & Co., Juni Oli, Kamptee—Want services of a soap expert who can manufacture washing soap on commercial scale by semi boiling process.

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7, Colootola Street, Calcutta.

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